May 1987 FORM: OM-882

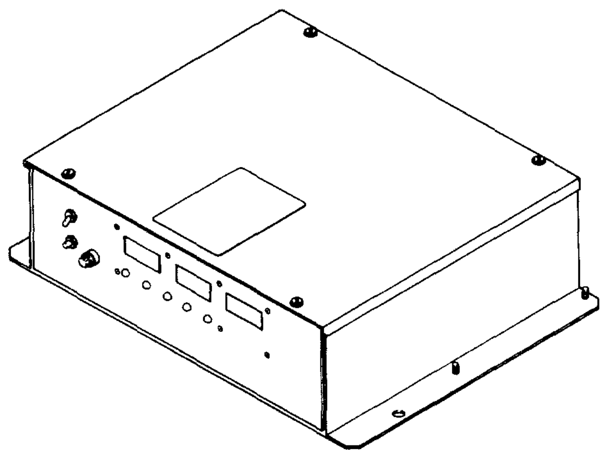
Effective With Serial No. JH133291

IMPORTANT: Read and understand the entire contents of both this manual and the power source manual used with this unit, with special emphasis on the safety material throughout both manuals, before installing, operating, or maintaining this equipment. This unit and these instructions are for use only by persons trained and experienced in the safe operation of welding equipment. Do not allow untrained persons to install, operate, or maintain this unit. Contact your distributor if you do not fully understand these instructions.

MODEL

MR-5/ARC PAK™ 350 COMPUTER INTERFACE

GAS/CURRENT SENSING CONTROL



OWNER'S MANUAL

miller®

MILLER ELECTRIC MFG. CO.
718 S. BOUNDS ST, P.O. Box 1079
APPLETON, WI 54912 USA

ADDITIONAL COPY PRICE 95 CENTS

NWSA CODE NO. 4579
PRINTED IN U.S.A

LIMITED WARRANTY

EFFECTIVE: OCTOBER 1, 1986

This warranty supersedes all previous MILLER warranties and is exclusive with no other guarantees or warranties expressed or implied.

LIMITED WARRANTY - Subject to the terms and conditions hereof, Miller Electric Mfg. Co., Appleton, Wisconsin warrants to its Distributor/Dealer that all new and unused Equipment furnished by Miller is free from defect in workmanship and material as of the time and place of delivery by Miller. No warranty is made by Miller with respect to engines, trade accessories or other items manufactured by others. Such engines, trade accessories and other items are sold subject to the warranties of their respective manufacturers, if any . All engines are warranted by their manufacturer for one year from date of original purchase, except Tecumseh engines which have a two year warranty.

Except as specified below, Miller's warranty does not apply to components having normal useful life of less than one (1) year, such as spot welder tips, relay and contactor points, MILLERMATIC parts that come in contact with the welding wire including nozzles and nozzle insulators where failure does not result from defect in workmanship or material.

Miller shall be required to honor warranty claims on warranted Equipment in the event of failure resulting from a defect within the following periods from the date of delivery of Equipment to the original user:

1. Arc welders, power sources, robots, and components . 1 year
2. Load banks .... 1 year
3. Original main power rectifiers .... 3 years (labor - 1 year only)
4. All welding guns, feeder/guns and plasma torches . . . 90 days
5. All other Millermatic Feeders .... 1 year
6. Replacement or repair parts, exclusive of labor . . 60 days
7. Batteries .... 6 months

provided that Miller is notified in writing within thirty (30) days of the date of such failure.

As a matter of general policy only, Miller may honor claims submitted by the original user within the foregoing periods.

In the case of Miller's breach of warranty or any other duty with respect to the quality of any goods, the exclusive remedies therefore shall be, at Miller's option (1) repair or (2) replacement or, where authorized in writing by Miller in appropriate cases, (3) the reasonable cost of repair or replacement at an authorized Miller service station or (4) payment of or credit for the purchase price (less reasonable depreciation based upon actual use) upon return of the goods at Customer's risk and expense. MILLER's option of repair or replacement will be F.O.B., Factory, at Appleton, Wisconsin, or F.O.B., at a MILLER authorized service facility, therefore, no compensation for transportation costs of any kind will be allowed. Upon receipt of notice of apparent defect or failure, Miller shall instruct the claimant on the warranty claim procedures to be followed.

ANY EXPRESS WARRANTY NOT PROVIDED HEREIN AND ANY IMPLIED WARRANTY, GUARANTY OR REPRESENTATION AS TO PERFORMANCE, AND ANY REMEDY FOR BREACH OF CONTRACT WHICH, BUT FOR THIS PROVISION, MIGHT ARISE BY IMPLICATION, OPERATION OF LAW, CUSTOM OF TRADE OR COURSE OF DEALING, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR PARTICULAR PURPOSE, WITH RESPECT TO ANY AND ALL EQUIPMENT FURNISHED BY MILLER IS EXCLUDED AND DISCLAIMED BY MILLER.

EXCEPT AS EXPRESSLY PROVIDED BY MILLER IN WRITING, MILLER PRODUCTS ARE INTENDED FOR ULTIMATE PURCHASE BY COMMERCIAL/INDUSTRIAL USERS AND FOR OPERATION BY PERSONS TRAINED AND EXPERIENCED IN THE USE AND MAINTENANCE OF WELDING EQUIPMENT AND *NOT* FOR CONSUMERS OR CONSUMER USE. MILLER'S WARRANTIES DO NOT EXTEND TO, AND NO RESELLER IS AUTHORIZED TO EXTEND MILLER'S WARRANTIES TO, ANY CONSUMER.

May 31, 1990 FORM: OM-882

ERRATA SHEET

After this manual was printed, refinements in equipment design occurred. This sheet lists exceptions to data appearing later in this manual.

AMENDMENT TO SECTION 2 – INSTALLATION

IMPORTANT: *A 25 ft. (8m) interconnecting cord with a five-pin Amphenol plug is supplied with this unit but is not used in this installation. Retain cord for future use.*

Add the following IMPORTANT block to the end of Section 2-3A. COMPUTER INTERFACE - WELDING POWER SOURCE CONNECTIONS: Wire Stick Sensing Connections

IMPORTANT: *If dc electrode negative welding is desired, reverse connections so the lead with ring terminal is connected to the negative weld output terminal and the lead with a clamp is connected to the positive weld output terminal.*

Amend Section 2-3C. COMPUTER INTERFACE - WELDING POWER SOURCE CONNECTIONS: 115 Volts AC/Contactor Control Connection

IMPORTANT: *Cords are supplied that may not be used in this installation. Match cord to welding power source and computer interface available.*

1. Align keyways, insert 4-socket Amp plug into matching receptacle on computer interface, and rotate threaded collar fully clockwise.
2. Align keyway, insert 14-pin Amphenol plug into matching receptacle on welding power source, and rotate threaded collar fully clockwise.
3. Place appropriate remote control switch(es) on the welding power source in the proper position for use of a remote control device.

Amend Section 2-5. COMPUTER INTERFACE TERMINAL STRIP CONNECTIONS

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit, welding power source, and robot, and disconnect input power employing lockout/tagging procedures before making interconnections.*

Lockout/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

There are several terminal strips inside the computer interface for control connections. Remove unit top cover, loosen screws on strain relief on unit rear panel if necessary, and locate appropriate terminal strip for connections. Tighten screws on strain relief if necessary, and reinstall top cover when procedure is finished.

A. CV/CC Connections

WARNING: Read and follow safety information at beginning of Section 2-5 before proceeding.

1. Locate terminal strip 2T.
2. For CC operation, remove jumper link between terminal E and F on 2T.

IMPORTANT: *The Inductance control is disabled when operating in the CC (constant current) mode.*

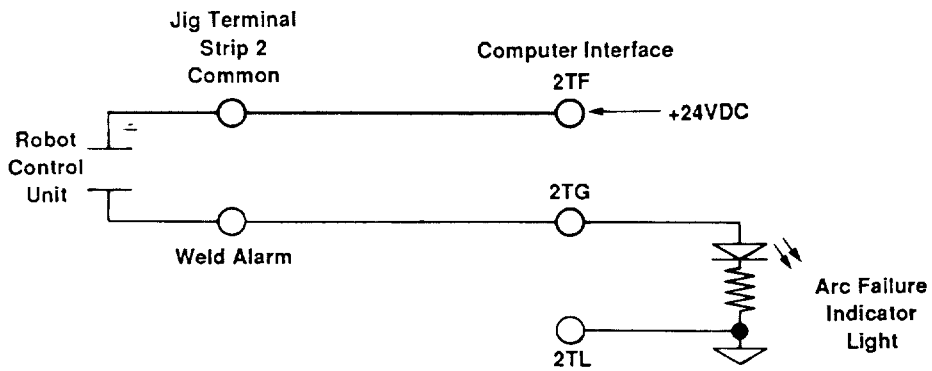
B. ARC FAILURE Light Connections (Figure 2-4)

WARNING: Read and follow safety information at beginning of Section 2-5 before proceeding.

The ARC FAILURE light on the computer interface front panel is turned on and off by a signal from the robot control unit. Locate supplied length of 18 gauge/2-conductor cord for this connection, and proceed as follows:

1. For robot control units with no other connections at jig terminal strip 2:
   a. Open robot control unit door, and locate jig terminal strip 2.
   b. Route cord under cross member below door.
   c. Make cord connections to terminal strip common and the Weld Alarm terminal.
   d. Close robot control unit door, and route cord through strain relief on rear panel of computer interface.
   e. Connect cord to 2TF and 2TG.
2. For robot control units when 115 or 24 vac, or 24 vdc is used at jig terminal strip 2T:
   a. Obtain a 115 or 24 vac, or 24 vdc isolation relay, and install into jig interface.
   b. Open robot control unit door, and locate jig terminal strip 2.
   c. Route customer supplied 18 gauge/2-conductor cord under cross member below door.
   d. Make cord connections to terminal strip common and the Weld Alarm terminal.
   e. Close robot control unit door, and route cord to jig interface.
   f. Connect cord to isolation relay coil and voltage source.
   g. Cut off terminals from one end of supplied 18 gauge/2-conductor cord, and install terminals to connect to contacts on isolation relay.
   h. Connect one end of cord to a set of normally-open contacts on isolation relay.
   i. Route cord through strain relief on rear panel of computer interface.
   j. Connect cord to 2TF and 2TG.

Add Figure 2-4. Arc Failure Light Connections



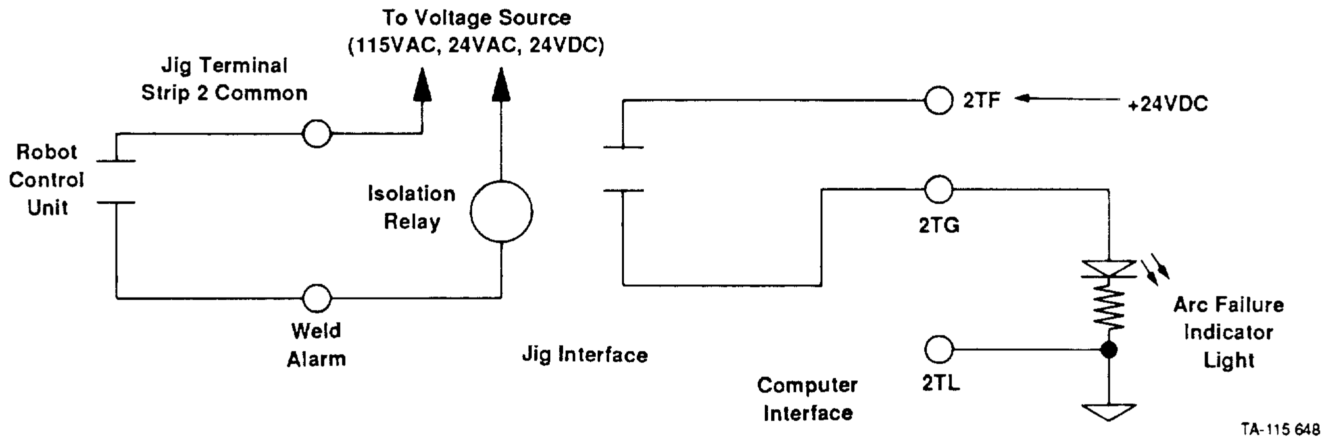


Figure 2-4. Arc Failure Light Connections

AMENDMENT TO SECTION 5 – MAINTENANCE & TROUBLESHOOTING

Add the following Step to Section 5-1. INSPECTION AND UPKEEP

3. Inspect motor control relay, CR2, and clean or replace as required.

Amend Figure 5-3. Circuit Diagram For Computer Interface (see Page 4 on this Errata)

Amend Figure 5-4. Circuit Diagram For Voltage Control Board PC1 (see Page 5 on this Errata)

Amend Figure 5-6. Circuit Diagram For Interface Board PC3 (see Page 6 on this Errata)

Add Figure 5-9. Wiring Diagram (see Pages 7 and 8 on this Errata)

Amend Figure 5-3. Circuit Diagram For Computer Interface

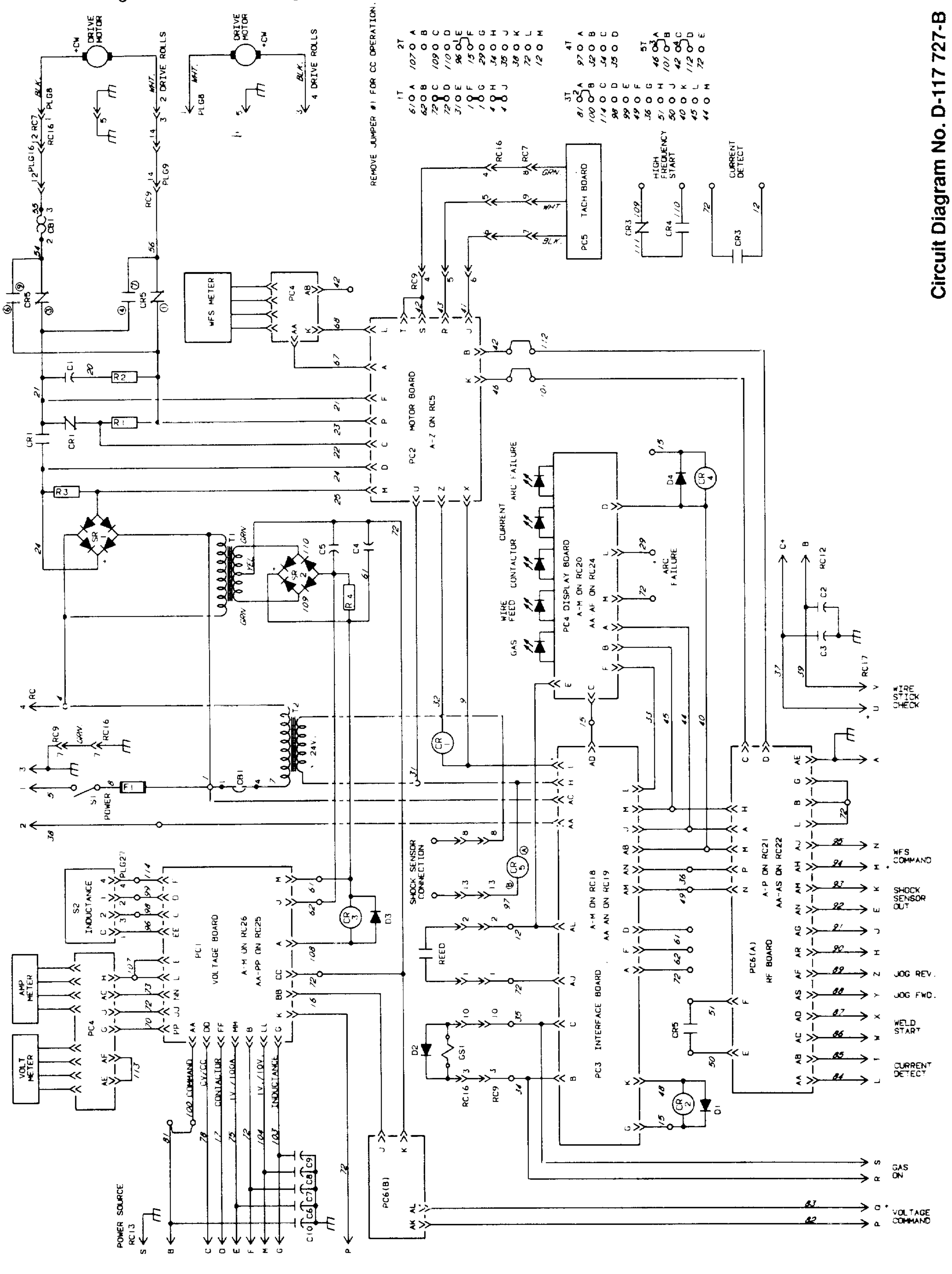
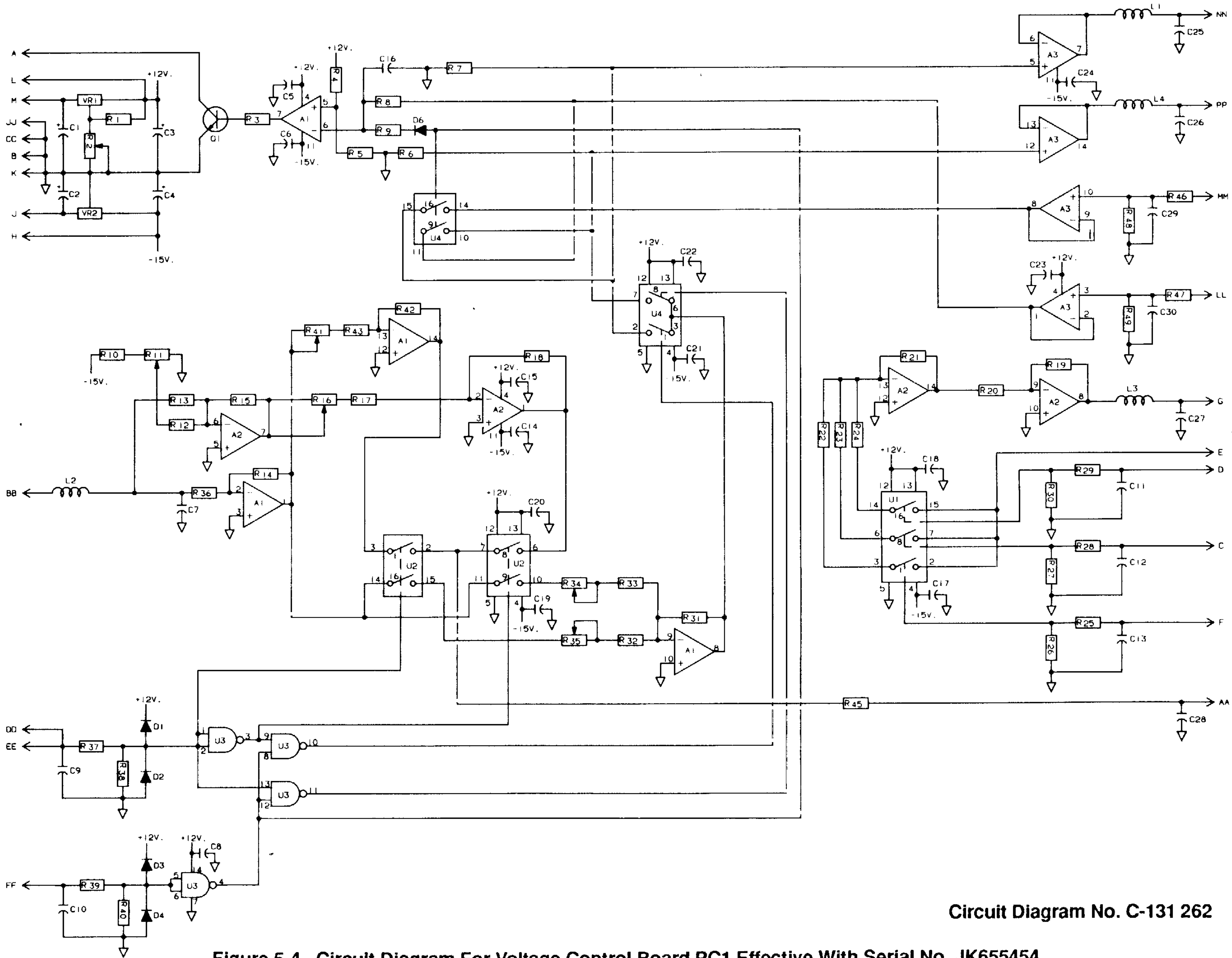


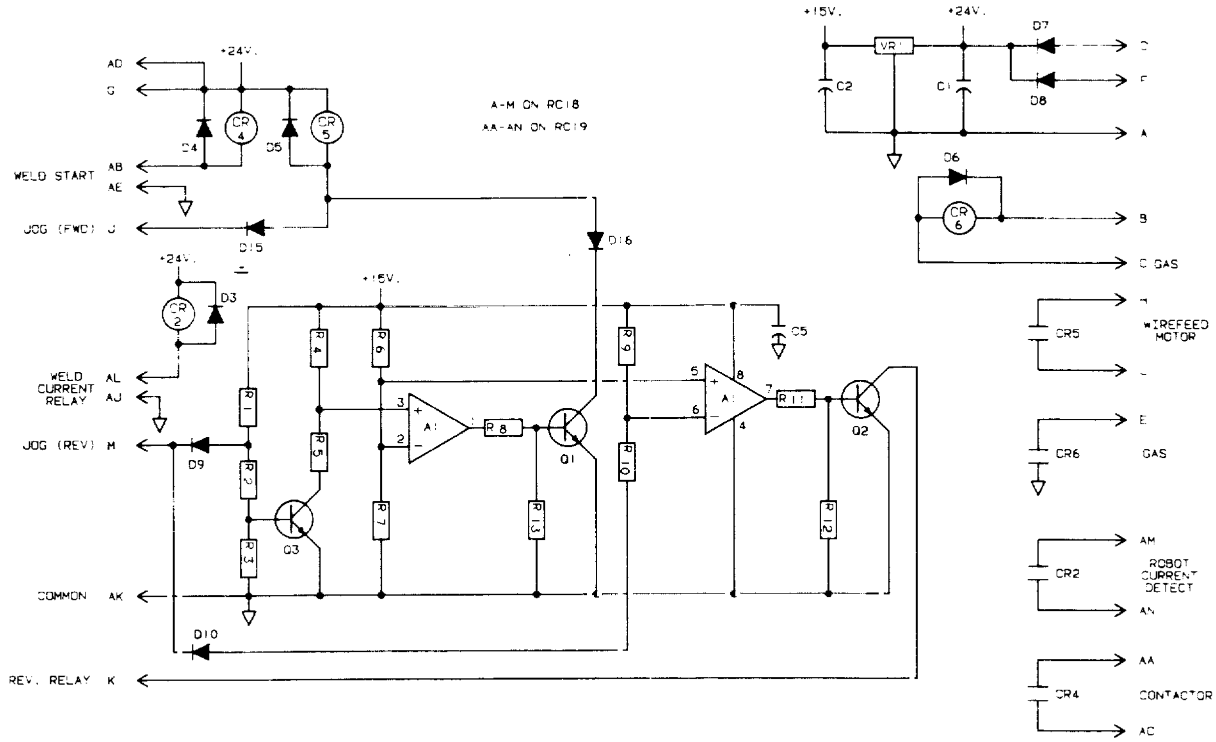
Figure 5-3. Circuit Diagram For Computer Interface Effective With Serial No. JH290689

Circuit Diagram No. D-117 727-B



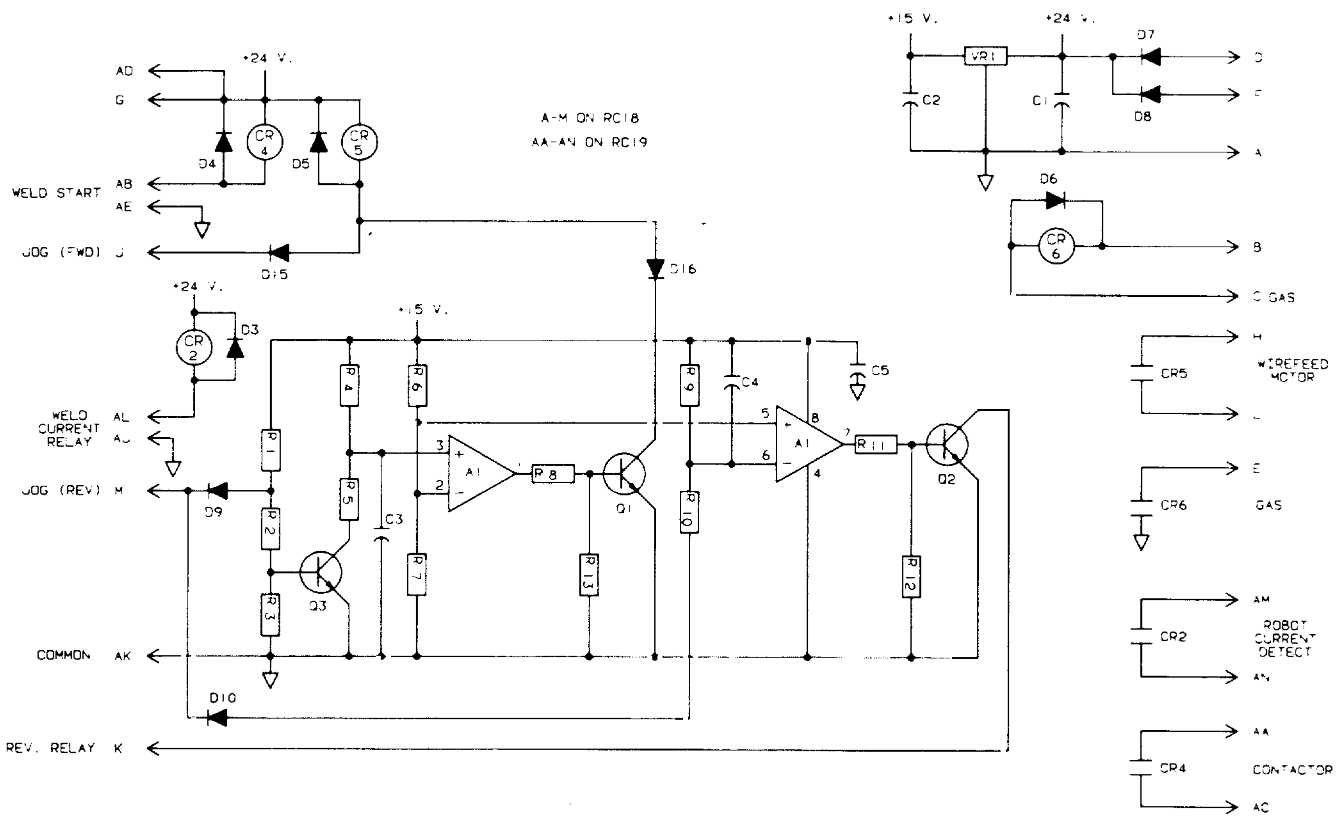
Circuit Diagram No. C-131 262

Figure 5-4. Circuit Diagram For Voltage Control Board PC1 Effective With Serial No. JK655454



Circuit Diagram No. B-128 016-A

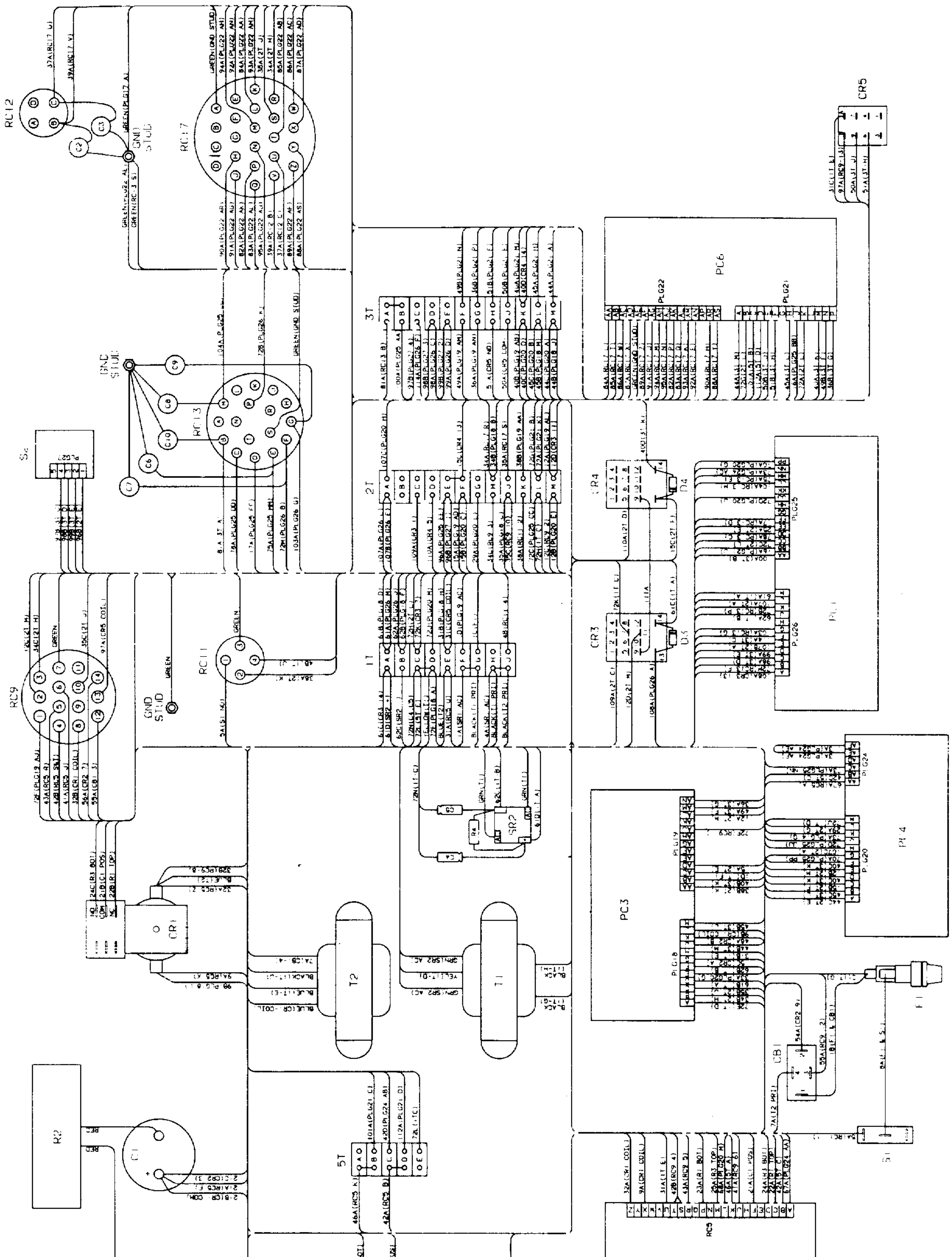
Figure 5-6. Circuit Diagram For Interface Board PC3 Effective With Serial No. JK588314 Thru KA819026



Circuit Diagram No. B-137 905

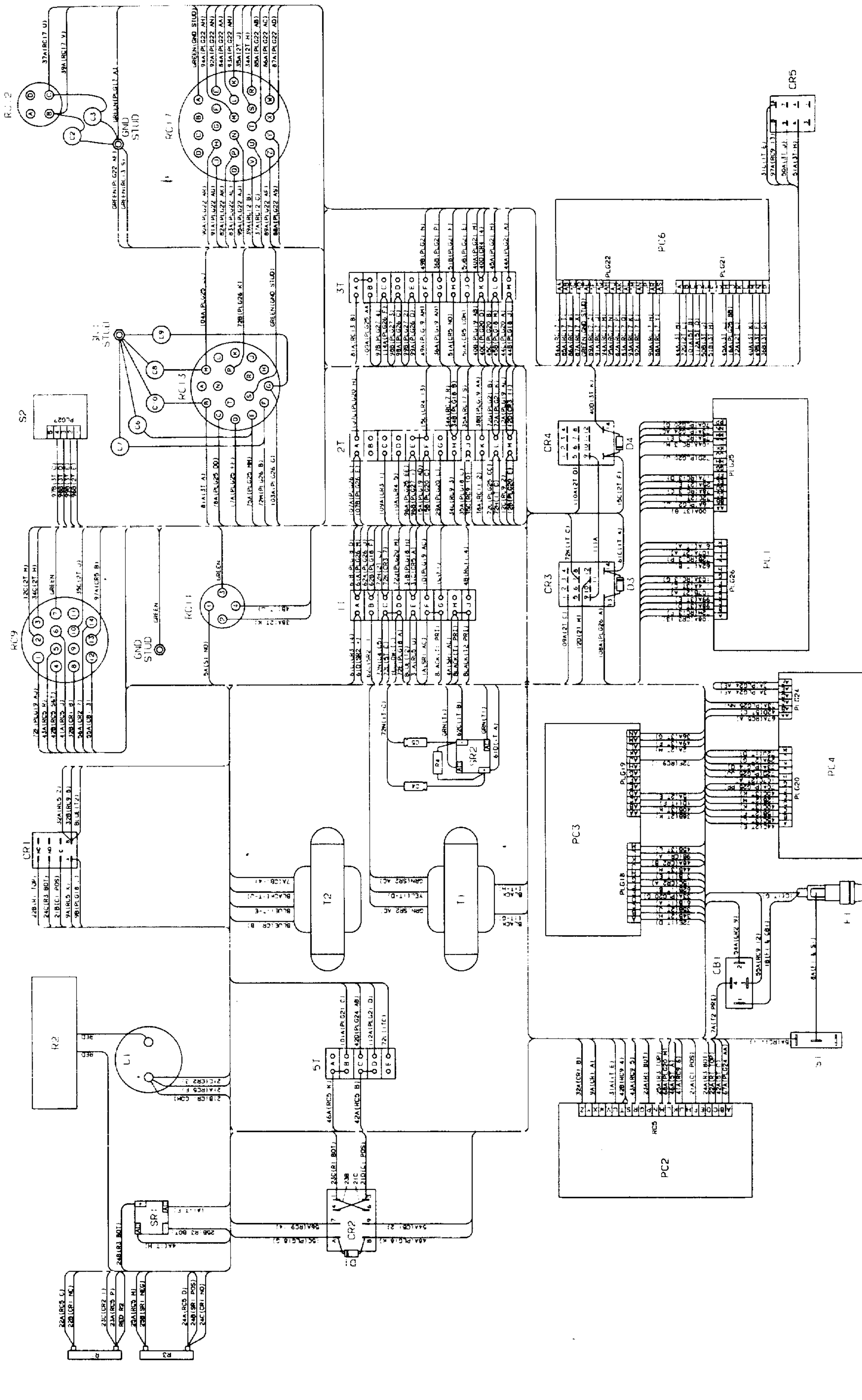
Figure 5-6.Circuit Diagram For Interface Board PC3 Effective With Serial No. KA819027

Add Figure 5-9. Wiring Diagram



Wiring Diagram No. D-117 728

Figure 5-9. Wiring Diagram Effective With Serial No. JH290689 Thru JK636568



Wiring Diagram No. D-129 906

Figure 5-9. Wiring Diagram Effective With Serial No. JK636569

AMENDMENT TO PARTS LIST

Amend Parts List as follows:

**	Dia. Mkgs	Part No.	Replaced With	Description	Quantity
2-1		111 992	117 724	CONTROL PANEL, (Eff w/JH290689 thru JK636568)	1
2-1		117 724	129 952	CONTROL PANEL, (Eff w/JK636569)	1
2-4		070 634	123 154	LABEL, warning general precautionary	1
2-17		049 989	118 676	CABLE, volt sensing (Eff w/HJ304076)	1
2-20		604 109	604 109	WIRE, (qty chg)	26ft
2-	C2,3,6-10	028 291	028 291	CAPACITOR, (qty chg)	7
2-39		090 890	135 304	CABLE, port No. 18 8/c (order by ft)	6ft
2-48	PC4	111 564	117 836	CIRCUIT CARD, meter	1
3-56	S1	011 622	011 609	SWITCH, tgl SPDT 15A 125V	1
3-		Added	110 438	CABLE, interconnecting 25ft (Eff w/JK678982) (consisting of)	1
			048 284	· HOUSING PLUG & SOCKETS, (consisting of)	1
			079 534	· · TERMINAL, female 1skt 14-18w	4
			079 531	· CLAMP, cable strain relief sz 11	1
			604 571	· CABLE, port No. 18 4/c (order by ft)	25ft
			111 122	· HOUSING PLUG & PINS, (consisting of)	1
			109 770	· · TERMINAL, female 1 pin sz 45 16-22w	14
4-	R1-5	044 635	030 028	RESISTOR, C .5W 1.5K ohm	1
6-2		083 147	083 147	GROMMET, (qty chg)	2
6-5	SR1,2	035 914	035 704	RECTIFIER, (qty chg) integ 30A 600V	2
6-12	CR1	034 841	109 006	RELAY, encl 24VAC DPDT (Eff w/JK636569)	1
6-15		110 375	110 375	STAND OFF, (qty chg)	7
6-16		111 065	121 313	PANEL, mtg-components (Eff w/JJ377225)	1
6-25	PC1	111 408	131 247	CIRCUIT CARD, voltage control (Eff w/JK655454)	1
6-26	PC3	113 221	128 014	CIRCUIT CARD, interface (Eff w/JK588314)	1
6-26	PC3	128 014	128 014	CIRCUIT CARD, interface, (Eff w/KA819027)	1
6-28	RC5	073 730	073 730	TERMINAL, hdr 22 pin	1
8-		073 739	073 739	CAPACITOR, (qty chg added C25-30) (Eff w/JK655454)	25
8-		000 885	000 885	RESISTOR, (qty chg added R46,47) (Eff w/JK655454)	11
8-	R48,49	Added	049 015	RESISTOR, CF .25W 10 meg ohm (Eff w/JK655454)	2
11-		072 130	072 130	CAPACITOR, (qty chg deleted C6, 9, 10) (Eff w/JK588314 thru KA819026)	
11-	C3	072 130	Deleted	Eff w/ KA819027	
11-	C4	005023	Deleted	Eff w/KA819027	
11-		073 739	073739	CAPACITOR (qty chg deleted C11 (Eff w/ JK588314)	
11-		028 351	028351	DIODE, (qty chg added D16) (Eff w/JK588314)	
13-		109 936	117 617	CONTROL BOX, gas/current sensor	1
13-3	REED	079 682	136 595	RELAY, current	1
13-6		010 610	115 104	CONNECTOR CLAMP, cable 1/2 in	1
	CR5		110 386	RELAY, encl 24VAC DPDT	1
	T1		117 725	TRANSFORMER, control	1
			117 726	CAPACITOR/RESISTOR, (consisting of)	1

Parts Lists Continued

	C4,5		000 859	· CAPACITOR, elctlt 220uf 35VDC	2
	R4		601 394	· RESISTOR, C 2W 10K ohm	1
13-		Added	136 584	BRACKET, mtg reed relay	1
13-		Added	007 501	WASHER, flat nyl .265 ID x .437 OD	2

**First digit represents page no - digits following dash represent item no.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

TABLE OF CONTENTS

Model	Weight
MR-5AP	31 lbs. (14 kg)
Gas/Current Sensing Control	5 lbs. (2.3 kg)

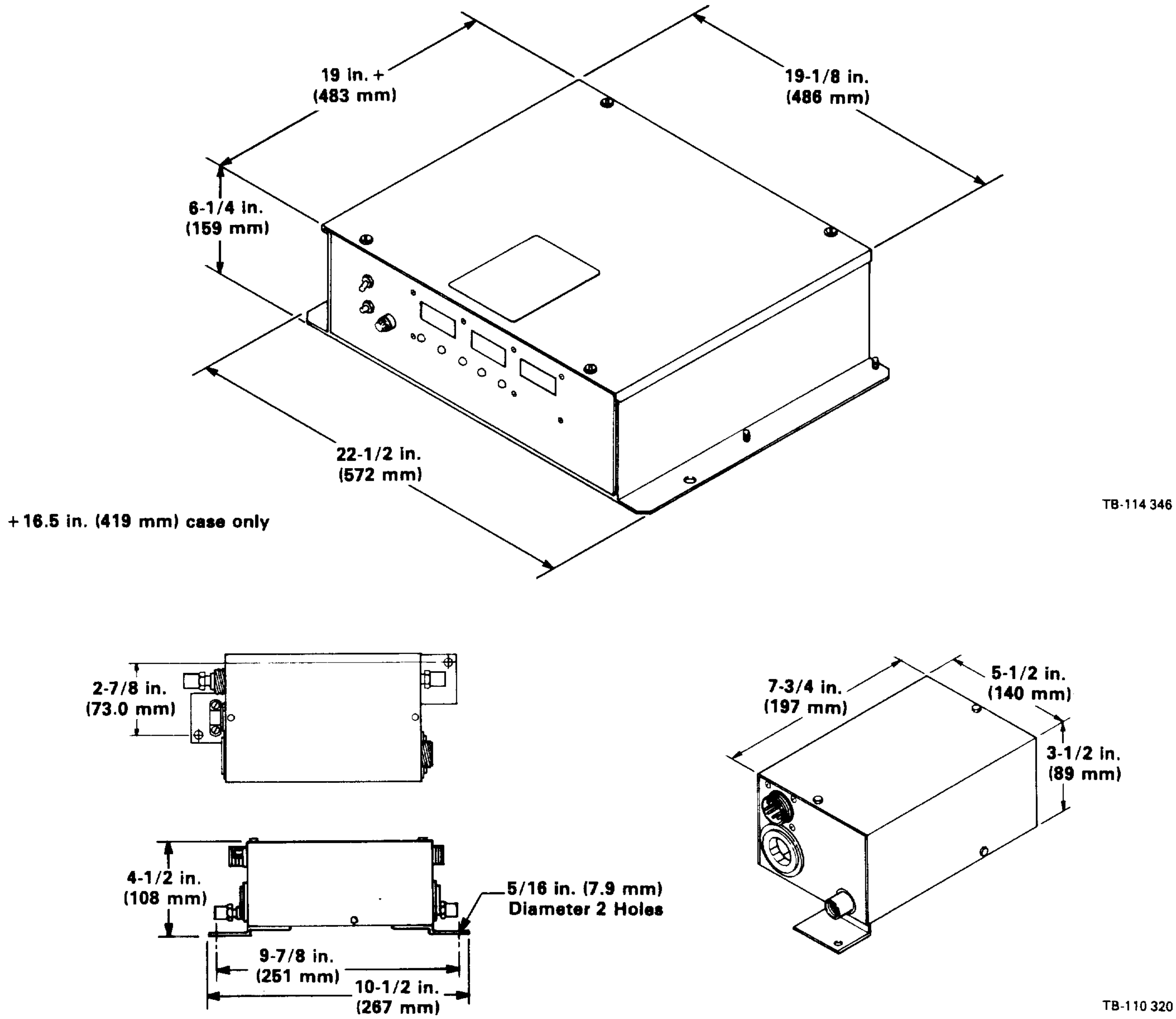


Figure 1 - 1. Specifications

1 - 1. GENERAL INFORMATION AND SAFETY

A. General

Information presented in this manual and on various labels, tags, and plates on the unit pertains to equipment design, installation, operation, maintenance, and troubleshooting which should be read, understood, and followed for the safe and effective use of this equipment.

B. Safety

The installation, operation, maintenance, and troubleshooting of arc welding equipment requires practices and procedures which ensure personal safety and the safety of others. Therefore, this equipment is to be installed, operated, and maintained only by qualified persons in accordance with this manual and all applicable codes such as, but not limited to, those listed at the end of Section 1 - Safety Rules For Operation Of Arc Welding Power Source in the welding power source Owner's Manual.

Safety instructions specifically pertaining to this unit appear throughout this manual highlighted by the signal words **WARNING** and **CAUTION** which identify different levels of hazard.

WARNING statements include installation, operation, and maintenance procedures or practices which if not carefully followed could result in serious personal injury or loss of life.

CAUTION statements include installation, operation, and maintenance procedures or practices which if not carefully followed could result in minor personal injury or damage to this equipment.

A third signal word, **IMPORTANT**, highlights instructions which need special emphasis to obtain the most efficient operation of this equipment.

1 - 2. RECEIVING-HANDLING - Before installing this equipment, clean all packing material from around the unit and carefully inspect for any damage that may have occurred during shipment. Any claim for loss or damage that may have occurred in transit must be filed **by the purchaser with the carrier.** A copy of the bill of lading will be furnished by the manufacturer on request if occasion to file claim arises.

When requesting information concerning this equipment, it is essential that Model Description and Serial Number of the equipment be supplied.

1 - 3. DESCRIPTION - The computer interface control contains wire feed speed, weld voltage, and weld amperage control circuitry, digital ammeter, voltmeter, and wire feed speed meter, and circuitry to interface with the robot control. The control is shipped for operation in the constant voltage mode but has constant current capabilities.

The gas/current sensing control contains the gas valve and current sensing reed relay.

These components function with the robot system when using the Gas Metal Arc Welding (GMAW) process.

SECTION 2 - INSTALLATION

2 - 1. LOCATION (Figure 1-1)

The location should allow room to open and remove covers and wrappers for installation, maintenance, and repair. Lead lengths must be considered when locating components.

Mounting holes are provided in each component for mounting purposes. Figure 1-1 gives unit dimensions.

Normally the computer interface is mounted on top of the robot control unit. The gas/current sensing control should be mounted in line between the welding power source and wire drive assembly. See installation section of robot manual for specific information.

The service life and efficiency of the system are reduced when it is subjected to high levels of dust, dirt, moisture, corrosive vapors, and extreme heat.

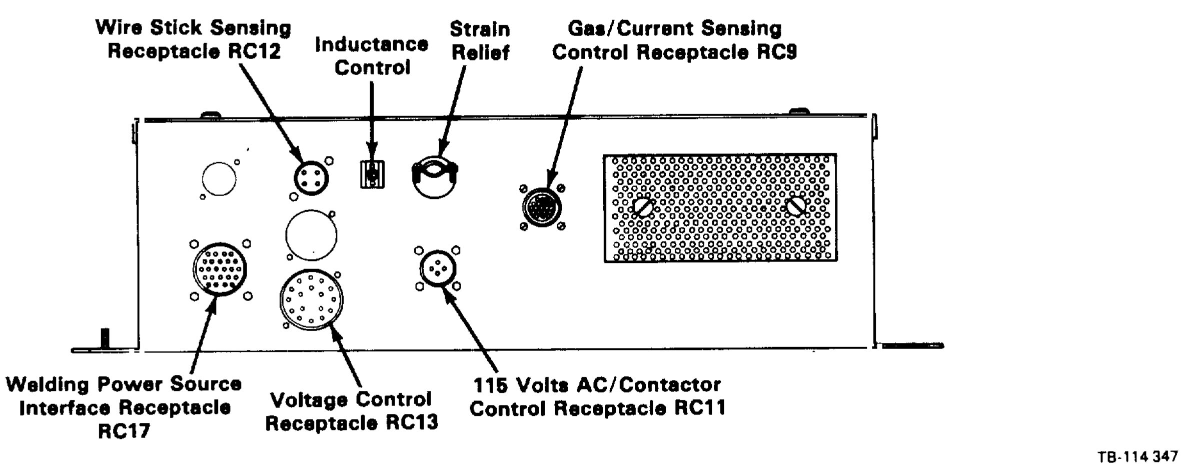


Figure 2 - 1. Rear Panel View

2 - 2. GAS/CURRENT SENSING CONTROL CONNECTIONS (Figures 2-1 And 2-2)

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit, welding power source, and robot, and disconnect input power employing "lockout/tagging procedures" before making interconnections.*

Lockout/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

A. Computer Interface - Gas/Current Sensing Control Connections

1. Align keyways, insert 14-pin Amp plug into matching receptacle on computer interface, and rotate threaded collar fully clockwise.
2. Align keyways, insert 16-pin Amp plug into matching receptacle on gas/current sensing control, and rotate threaded collar fully clockwise.

B. Gas/Current Sensing Control - Motor Connections

Align keyways, insert 14-pin plug from motor into matching receptacle on gas/current sensing control, and rotate threaded collar fully clockwise.

C. Weld Cable Connections

Route cable from welding power source positive weld output terminal, through the gas/current sensing control, to the wire drive assembly and connect cable to weld cable terminal (see Motor/Drive Assembly Owner's Manual for location).

D. Gas Connections

Connect hose from gas regulator/flowmeter (customer supplied) at gas source to IN fitting on gas/current sensing control. Connect gas hose from wire drive assembly to fitting on gas/current sensing control. The gas flow must be accurately controlled by a regulator/flowmeter at the source.

E. Touch Sensor Connections

Connect cord with two friction connectors coming from gas/current sensing control to touch sensor leads coming from outlet cable. Polarity is not important for this connection.

2 - 3. COMPUTER INTERFACE - WELDING POWER SOURCE CONNECTIONS (Figures 2-1 And 2-2)

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit, welding power source, and robot, and disconnect input power employing "lockout/tagging procedures" before making interconnections.*

Lockout/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

There are several cords used for interconnections between the computer interface and welding power source. Examine and select the proper cord for the following connections.

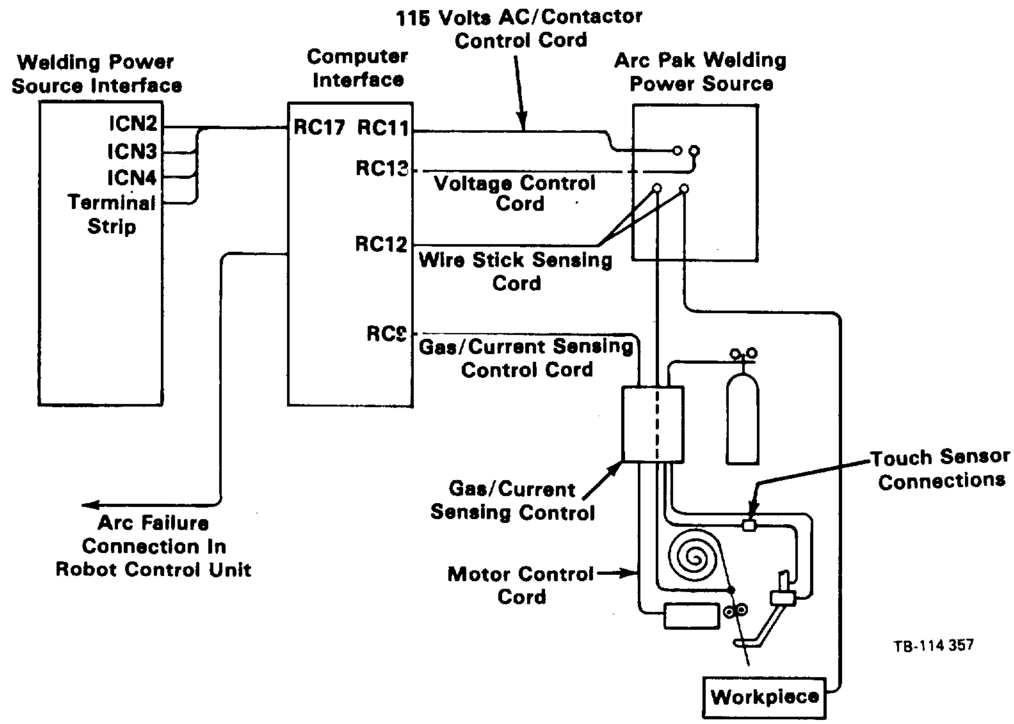


Figure 2 - 2. Interconnection Diagram

A. Wire Stick Sensing Connections

1. Align keyway, insert four-socket Amphenol plug into matching receptacle on computer interface, and rotate threaded collar fully clockwise.
2. Connect lead with ring terminal to welding power source positive output terminal.
3. Connect lead with clamp to welding power source negative output terminal.

B. Voltage Control Connections

1. Align keyway, insert 17-socket plug into matching receptacle on computer interface, and rotate threaded collar fully clockwise.
2. Align keyway, insert 17-pin plug into matching receptacle on welding power source, and rotate threaded collar fully clockwise.

C. 115 Volts AC/Contactor Control Connections

Two cords are necessary for this connection. One cord, supplied with the welding power source, has a 14-pin Amphenol plug and two twistlock receptacles. The second, supplied with the robot, has two twistlock plugs and a four-pin Amp plug.

1. Align keyways, insert four-pin Amp plug into matching receptacle on computer interface, and rotate threaded collar fully clockwise.
2. Connect the twistlock receptacles to the matching plugs, and rotate plugs clockwise.
3. Align keyway, insert 14-pin Amphenol plug into matching receptacle on welding power source, and rotate threaded collar fully clockwise.

2 - 4. COMPUTER INTERFACE - WELDING POWER SOURCE INTERFACE CONNECTIONS (Figures 2-1, 2-2, And 2-3)

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit, welding power source, and robot, and disconnect input power employing "lockout/tagging procedures" before making interconnections.*

Lockout/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

1. Align keyway, insert 24-socket plug into matching receptacle on computer interface, and rotate threaded collar fully clockwise.
2. Align keyways, insert four-, six-, and ten-pin plugs from interconnecting cord into matching receptacles on bottom of welding power source interface, and rotate threaded collars fully clockwise.

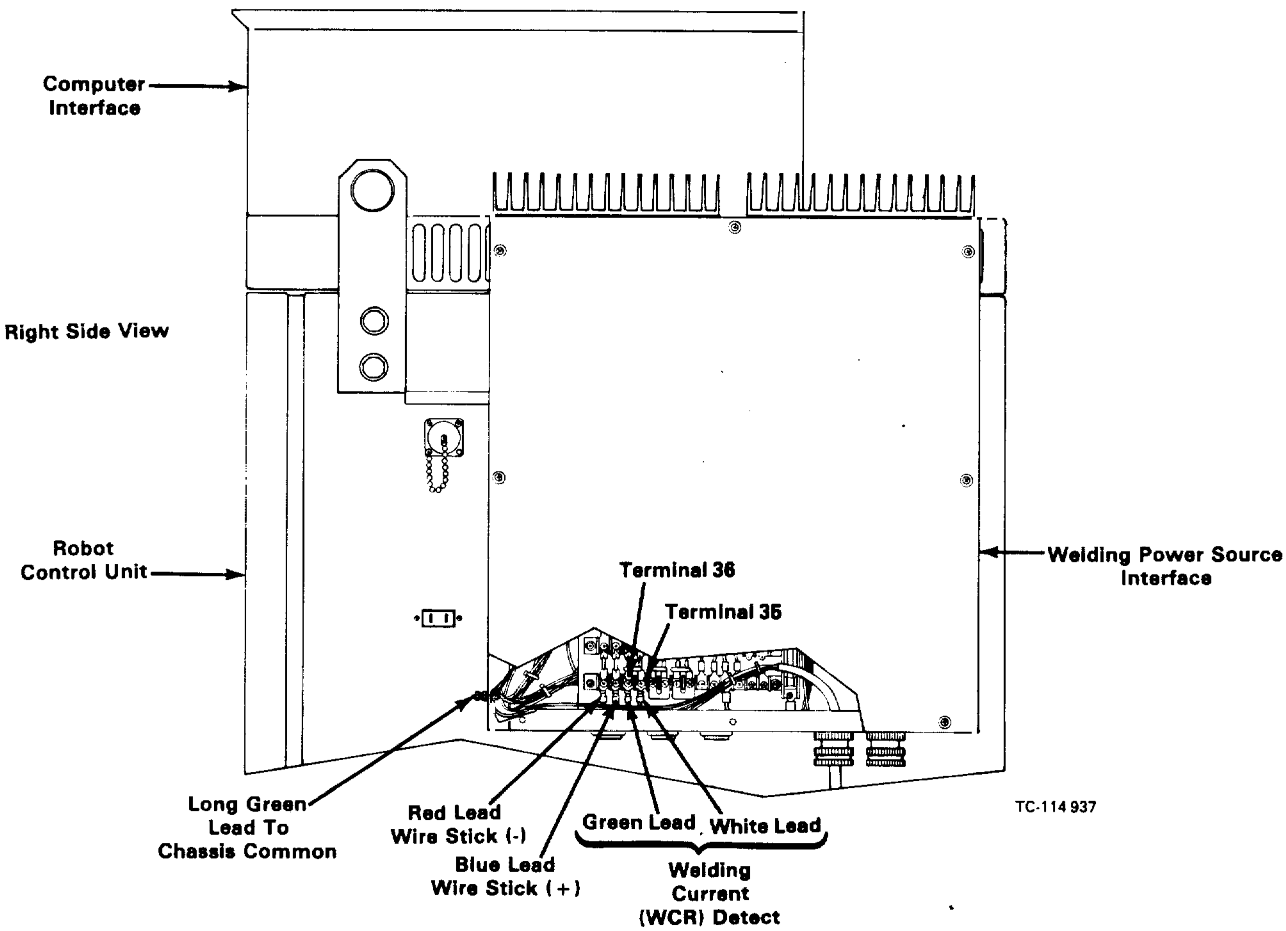


Figure 2 - 3. Welding Power Source Interface Connections

3. Remove welding power source interface side panel.

4. Route remaining cord from computer interface through strain relief in bottom of welding power source interface, to 14-position terminal strip.

5. Connect leads as follows:

   a. Red lead to terminal 52.

   b. Blue lead to terminal 50.

   c. White lead to terminal 35.

   d. Green lead to terminal 36.

   e. Long green lead with ring terminal connects to chassis ground.

6. Reinstall and secure side panel.

2 - 5. COMPUTER INTERFACE TERMINAL STRIP CONNECTIONS

IMPORTANT: *A 25 ft. (8m) interconnecting cable with a five-pin Amphenol plug is supplied with this unit but is not used in this installation. Retain cable for future use.*

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit, welding power source, and robot and disconnect input power employing "lockout/tagging procedures" before making interconnections.*

Lockout/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

There are several terminal strips inside the computer interface for control connections. Remove unit top cover, loosen screws on strain relief on unit rear panel if necessary, and locate appropriate terminal strip for connection. Tighten screws on strain relief if necessary, and reinstall top cover when procedure is finished.

A. ARC FAILURE Light Connections

The ARC FAILURE light on the computer interface front panel is turned on and off by a signal from the robot control unit. The robot control unit must supply 24 volts dc to the computer interface arc failure circuit when arc failure occurs. Locate supplied length of 18 gauge/2 conductor cord for this connection, and proceed as follows:

1. Open robot control unit door, and locate jig terminal strip 2.
2. Route cord under cross member below door.
3. Make cord connections to terminal strip common and the Weld Alarm terminal.
4. Close robot control unit door, and route cord through strain relief on rear panel of computer interface.
5. Connect cord common to 2TL and positive to 2TG.

B. CV/CC Connections

1. Locate terminal strip 2T.
2. For CC operation, remove jumper link between terminals E and F on 2T.

IMPORTANT: *The Inductance control is disabled when operating in the CC (constant current) mode.*

SECTION 3 - FUNCTION OF CONTROLS

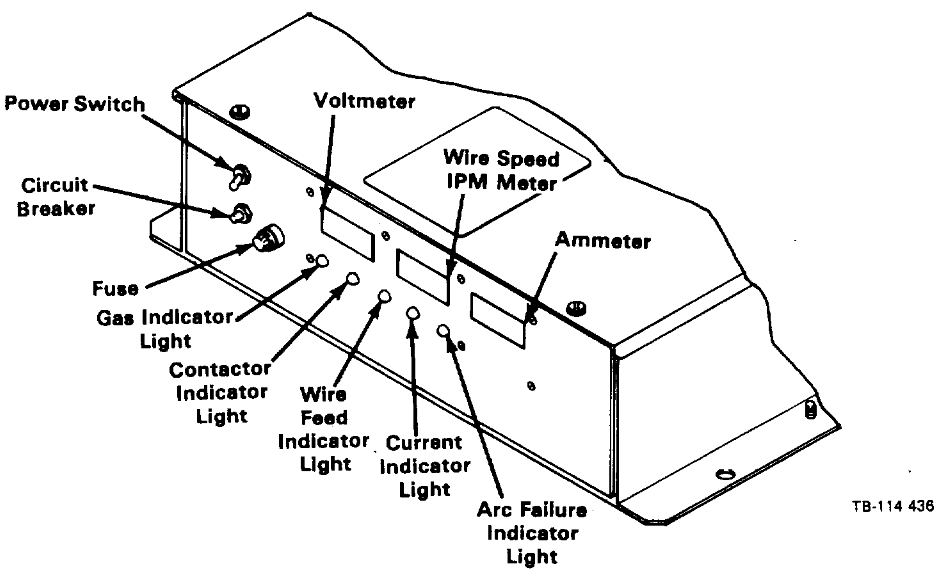


Figure 3 - 1. Front Panel View

3 - 1. POWER SWITCH (Figure 3-1)

Placing the POWER switch in the ON position applies input power to the interface. The interface must be on for the robot to weld. Placing the POWER switch in the OFF position shuts down the interface.

3 - 2. INDUCTANCE CONTROL (Figure 2-1)

The INDUCTANCE control is a digital pushbutton control which can be set for inductance levels 1 through 7. As the level of inductance increases, the rate of change of the weld output or speed of response slows down. The slower response time produces a softer arc, more fluid welding puddle, and flatter, smoother bead.

The 0 (zero) setting gives minimum inductance, i.e., a stiff, fast-responding arc, and a small, fast-freezing puddle. The 7 setting gives maximum inductance characteristics, i.e., a soft, slow-responding, low spatter arc, and high weld puddle fluidity.

Select a setting best suited for the application.

3 - 3. OVERLOAD PROTECTION (Figure 3-1)

A. Fuse Protection

The interface is protected from damage due to an internal short or excessive overload by fuse F1. If fuse F1 opens, the interface shuts down. See Section 5-2 for replacement procedures.

B. Wire Drive Motor Circuit Breaker

The wire drive motor is protected from damage due to overload by circuit breaker CB1. If CB1 opens, the interface shuts down. Manually depress the reset button to reset the circuit breaker.

3 - 4. VOLTMETER (Figure 3-1)

The voltmeter displays weld voltage to the nearest tenth of a volt while welding and preset voltage while idling.

3 - 5. WIRE SPEED METER (Figure 3-1)

The wire speed meter displays preset wire feed speed to the nearest inch per minute while welding and idling. Actual and preset wire feed speed are the same due to the wire feed speed feedback circuit.

3 - 6. AMMETER (Figure 3-1)

The ammeter displays weld amperage to the nearest amp while welding and preset amperage while idling.

3 - 7. INDICATOR LIGHTS (Figure 3-1)

There are five indicator lights on the interface. These are visual indications of various process functions.

The GAS light turns on when the gas valve is energized to indicate shielding gas flow.

The CONTACTOR light turns on when the welding power source contactor is energized to indicate that weld output is available.

The WIRE FEED light turns on when the wire drive motor is energized to indicate that wire is feeding.

The CURRENT light turns on when the current detect relay is energized to indicate that an arc is established.

The ARC FAILURE light turns on when there is an arc outage while welding.

SECTION 4 - SEQUENCE OF OPERATION

4 - 1. INPUT SIGNAL FROM WELDING POWER SOURCE (Figure 4-1) - The welding power source and wire drive motor send signals to the computer interface. These signals are used to determine weld parameters. During welding these signals are compared to preset welding values and compensations are made to keep weld parameters at preset levels.

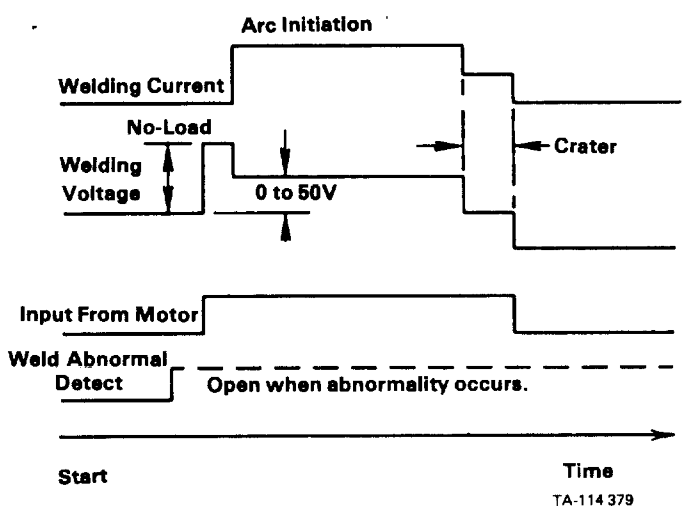


Figure 4 - 1. Input Signal Timing Chart

4 - 2. OUTPUT SIGNALS FROM COMPUTER INTERFACE (Figure 4-2) - The interface interprets the input signals from the welding power source, wire drive motor, robot, and wire stick check circuit. The output of the computer interface regulates the welding power source and wire feed functions while welding.

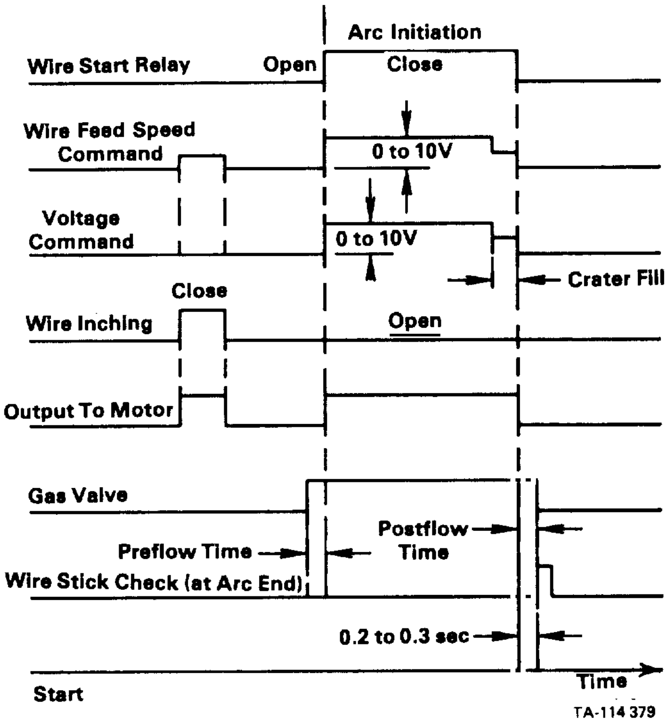


Figure 4 - 2. Output Signal Timing Chart

4 - 3. WIRE STICK CHECK (Figure 4-3) - After the weld is completed, the wire stick check is performed to determine if the welding wire has burned back out of the weld puddle.

Feedback is used to determine if the wire is free of the weld. If the feedback indicates the wire is free of the weld, the robot can cycle to its next sequence.

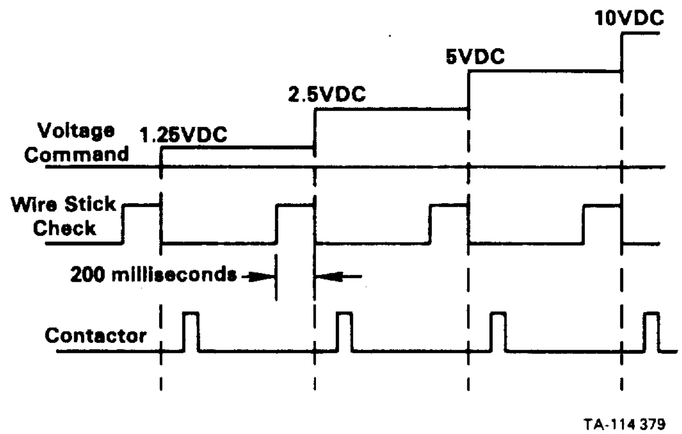


Figure 4 - 3. Wire Stick Check

If the feedback indicates the wire is stuck, the welding power source is sent a 1.25 VDC command signal to provide minimum welding power source output. The contactor is pulsed on. If the wire was stuck, the pulsed voltage should be enough to free the wire. Feedback is used to determine if the wire is now free of the weld. If the feedback indicates the wire is free, the robot can cycle to its next sequence.

If the feedback indicates the wire is still stuck, a higher voltage command is given, and the contactor pulsed to free the welding wire. The check is performed and two more voltage increases are used to try and free the welding wire (see Figure 4-3).

If the wire remains stuck, the robot will shut down, a Weld Abnormal error will be displayed on the robot program module, and the wire must be physically removed from the weld.

SECTION 5 - MAINTENANCE & TROUBLESHOOTING

IMPORTANT: *Every six months inspect the labels on this unit for legibility. All precautionary labels must be maintained in a clearly readable state and replaced when necessary. See the Parts List for part number of precautionary labels.*

5 - 1. INSPECTION AND UPKEEP

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit, welding power source, and robot and disconnect input power employing "lockout/tagging procedures" before internally inspecting or servicing.*

Lockout/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

Usage and shop conditions will determine the frequency and type of maintenance. Inspect equipment as follows:

1. Repair or replace, as required, all hoses, cords, and cables; give particular attention to frayed and cracked insulation and areas where it enters equipment.
2. Remove grease and grime from components; moisture from electrical parts and cables.

5 - 2. OVERLOAD PROTECTION (Figure 3-1)

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit, welding power source, and robot and disconnect input power employing "lockout/tagging procedures" before internally inspecting or servicing.*

Lockout/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

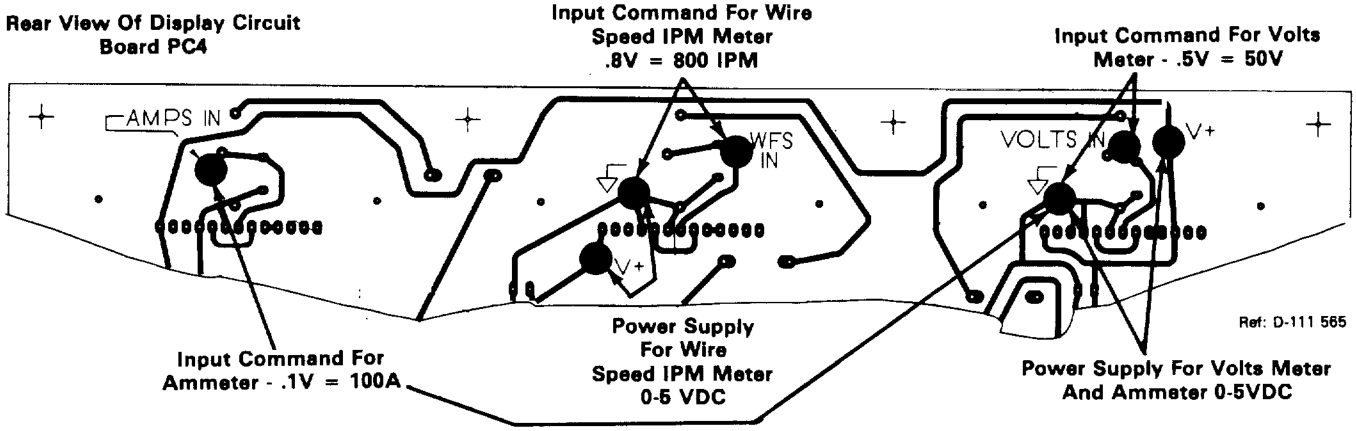


Figure 5 - 1. Display Board Meter Checks

CAUTION : IMPROPER FUSES can damage this unit.

- *If replacement becomes necessary, use only fuses of the proper size, type, and rating (see Parts List).*

To replace the fuse, proceed as follows:

1. Depress and rotate fuse holder cover counterclockwise.
2. Pull out fuse with cover when fuse holder cover is free.
3. Insert new fuse into fuse holder cover.
4. Install fuse with fuse holder cover back into unit.
5. Depress and rotate fuse holder cover clockwise until cover is secure.

5 - 3. DISPLAY BOARD METER CHECK (Figure 5-1) - Check points are provided on the display board for checking power supply and input command for the meters.

WARNING : ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Be sure that personnel performing testing procedures are familiar with and follow standard safety practices.*
- *Shut down unit before making or changing meter or test equipment lead connections.*

ELECTROSTATIC DISCHARGE (ESD) can damage electronic components.

- *Put on a properly grounded wrist strap BEFORE handling circuit boards.*
- *Transport all static-sensitive components in proper static-shielding carriers and packages.*
- *Perform work only at a static-safe work area.*

1. Remove computer interface top cover.
2. Locate display board PC4.
3. Check voltage according to Figure 5-1.
4. If a meter power supply and command voltage is correct and the meter is not working, replace the meter (see Section 5-4).
5. If the power supply or command voltage is incorrect, replace display board PC4 (see Section 5-4).

5 - 4. BOARD REPLACEMENT PROCEDURES (Figure 5-2)

WARNING : ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit, welding power source, and robot, and disconnect input power employing "lockout/tagging procedures" before inspecting or servicing.*

Lockout/tagging procedures consist of padlocking line disconnect switch in the open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

ELECTROSTATIC DISCHARGE (ESD) can damage circuit board components.

- *Put on properly grounded wrist strap BEFORE handling circuit boards.*
- *Transport all static-sensitive components in proper static-shielding carriers or packages.*
- *Perform work only at a static-safe work area.*

INCORRECTLY INSTALLED PLUGS can damage circuit boards.

- *Be sure that plugs are properly aligned and installed onto connectors before resuming operation.*

IMPORTANT : *All directions, such as left or right, are with respect to the operator facing the unit front panel. Retain all hardware removed during this procedure for reinstallation.*

A. Display Board PC4 And Meter Replacement

1. Remove unit top cover.

2. Remove screws securing board to stand-offs. Do not remove stand-offs.

3. Disconnect plugs PLG20 and PLG24 from matching receptacles on PC4.

4. Gently pull board straight away from front panel. Do not pull up or down; otherwise, the meters and LED's may be damaged.

5. To replace meter(s) proceed as follows:

   a. Remove nuts and lock washers from meter support.

   b. Gently pull meter straight out of socket. Retain spacers.

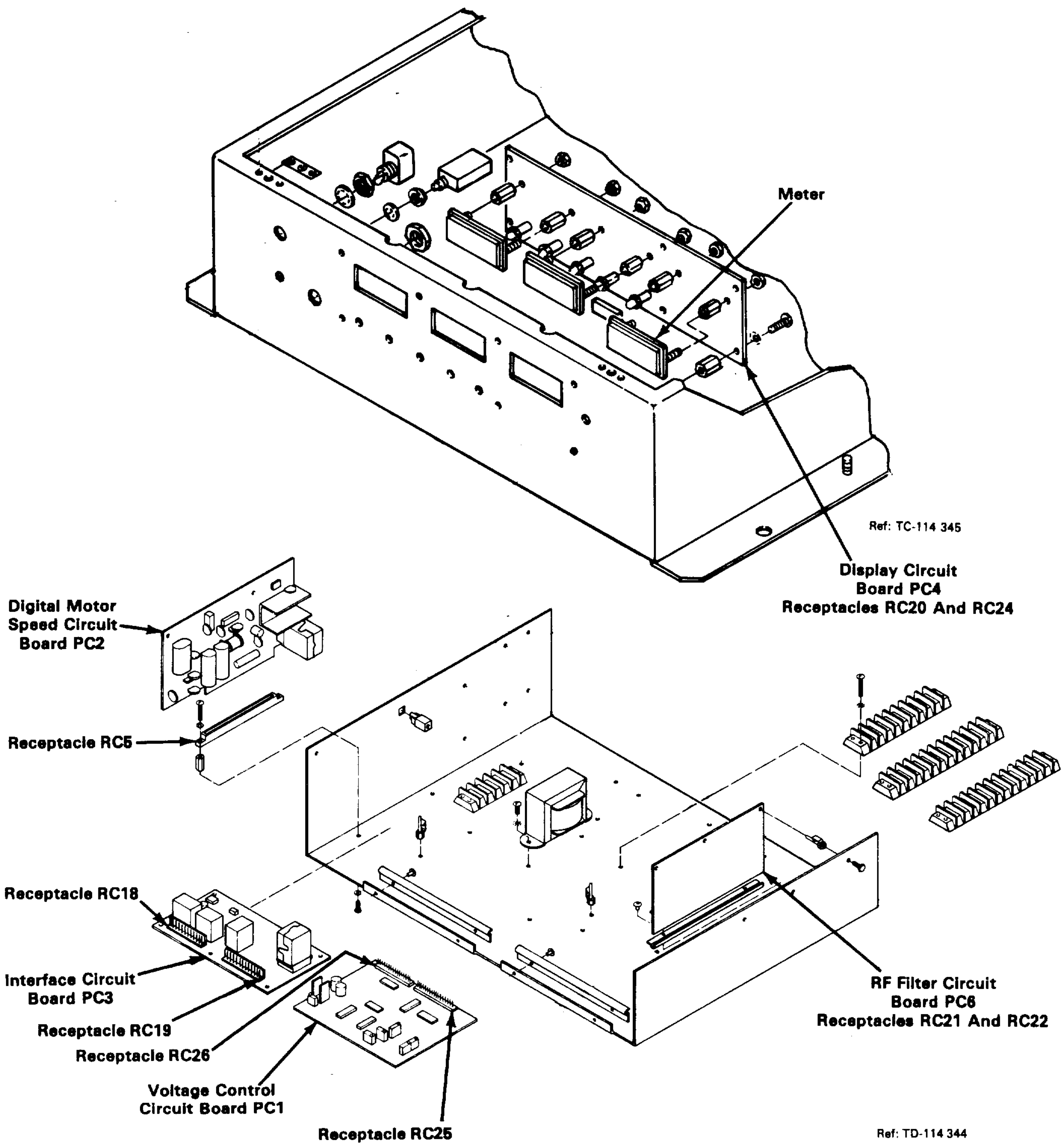


Figure 5 - 2. Circuit Board Replacement

c. Slide spacers onto new meter support.

d. Push meter into socket with meter supports protruding through to rear of PC4.

e. Reinstall lock washers and nuts to secure meter to board. Do not overtighten nuts or meter may be damaged.

6. To install replacement display board, carefully line board up with front panel openings for meters and LED's.

7. Reinstall securing screws.

8. Reconnect PLG20 and PLG24 to matching receptacles on new PC4.

9. Reinstall unit top cover.

B. Motor Board PC2 Replacement

1. Remove unit top cover.

2. Remove securing screw and unlatch standoff.

3. Gently pull board from receptacle RC5.

4. Insert new board into RC5.

5. Reinstall securing screw and latch standoff.

6. Reinstall unit top cover.

C. Replacement Procedure For Remaining Boards

1. Remove unit top cover and locate board.

2. Disconnect plug(s) from board.

3. Unlatch standoffs and slide board out of retaining rail.

4. Slide new board into retaining rail and latch standoffs.

5. Connect plug(s) to matching receptacle(s) on new board.

6. Reinstall unit top cover.

5 - 5. TROUBLESHOOTING CHART

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit, welding power source, and robot and disconnect input power employing "lockout/tagging procedures" before internally inspecting or servicing.*

Lockout/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

MOVING PARTS can cause serious injury.

- *Keep clear of moving parts.*

HOT SURFACES can cause severe burns.

- *Allow cooling period before servicing.*

Troubleshooting to be performed only by qualified persons.

It is assumed that the computer interface was properly installed according to Section 2 of this manual, the operator is familiar with the function of controls, the unit was working properly, and that the trouble is not related to the welding process. The following chart is designed to diagnose and provide remedies for some of the troubles that may develop in this unit.

Use this chart in conjunction with the circuit diagrams while performing troubleshooting procedures. If the trouble is not remedied after performing these procedures, the nearest Factory Authorized Service Station should be contacted. In all cases of equipment malfunction, the manufacturer's recommendations should be strictly followed.

TROUBLE	PROBABLE CAUSE	REMEDY
Unit does not operate.	Fuse F1 open.	Check F1, and replace if necessary (see Section 5-2). Correct overload problem before continuing operation.
	Circuit breaker CB1 tripped.	Check CB1, and reset if necessary. Correct overload problem before continuing operation.
No meter display.	Meter not working.	Use check points on display board PC4 to determine if power is available to meter (see Section 5-3). If check points are okay, replace meter (see Section 5-4).
	Display board PC4 not working.	Use check points to determine if power is available (see Section 5-3). If check points do not test okay, replace PC4 (see Section 5-4).

TROUBLE	PROBABLE CAUSE	REMEDY
No wire feed.	Robot signal.	Check input signal from robot to motor board PC2. Signal should be 0-10 vdc between pins K and B (common) on RC5.
	Relay CR1 not working.	Replace CR1.
	Motor board PC2 not working.	Replace PC2 (see Section 5-4).
Wire feeds at maximum.	Tach board PC5 at wire drive motor not working.	Replace PC5.
No arc voltage control.	Voltage control connections.	Check and secure connections (see Section 2-3).
	Wire stick sensing connections.	Check and secure connections (see Section 2-3).
	Voltage board PC1 not working.	Replace PC1 (see Section 5-4).
	Incorrect robot command voltage.	Check robot command voltage at voltage board PC1. Command voltage should be 0-10 vdc between pins BB and CC (common) at RC25.
Robot shuts down due to Touch Sensor error.	Touch Sensor connections.	Check continuity of leads between gun/torch and gas/current sensing control. Repair or replace. Secure all connections.
Robot moves when welding wire is stuck.	Wire stick connection.	Be sure that red lead is connected to terminal 52 and blue lead is connected to terminal 50 on welding power source interface 14 position terminal strip.
	Wire stick sensing connections.	Check and secure connections (see Section 2-3).
Wire speed (IPM) meter goes to zero.	Incorrect robot command voltage.	Check robot command voltage at motor board PC2. Signal should be 0-10 vdc between pins K and B (common) at RC5.
	Motor board PC2 not working.	Replace PC2 (see Section 5-4).
No wire retract.	Control relay CR2 not working.	Replace CR2.
	Interface board PC3 not working.	Replace PC3 (see Section 5-4).
	Incorrect robot command voltage.	Check robot command voltage at motor board PC2. Signal should be 0-10 vdc between pins K and B (common) at RC5.
Robot shuts down.	Loose weld output connections.	Clean and tighten connections.
	Interconnecting cords.	Check all interconnecting cords for breaks; repair or replace. Check and secure all connections.
	Interface board PC3 not working.	Replace PC3 (see Section 5-4).

5 - 6. USE OF INDICATOR LIGHTS FOR TROUBLESHOOTING

Gas Indicator Light

On

- Gas flows: System normal (on).
- Gas does not flow: Check gas valve operation.

Off

- Gas flows: Check gas valve operation and gas line for leaks. Check interface board PC3.
- Gas dodes not flow: System normal (off).

Contactor Indicator Light

On

- Contactor closed: System normal (on).
- Contactor open: Check interconnecting cords. Check interface board PC3.

Off

- Contactor closed: Check display board PC4.
- Contactor Open: System normal (off).

Wire Feed Indicator Light

On

- Wire feeds: System normal (on).
- Wire does not feed: Check circuit breaker CB1. Check relay CR1. Check interface board PC3.

Off

- Wire feeds: Check input signal from robot to motor board PC2. Signal should be 0-10 vdc between pins K and B (common) at RC5. Check wire feed board PC2.
- Wire does not feed: System normal (off).

Current Indicator Light

On

- Arc started: System normal (on).
- No arc: Replace reed relay.

Off

- Arc started: Replace reed relay.
- No arc: System normal (off).

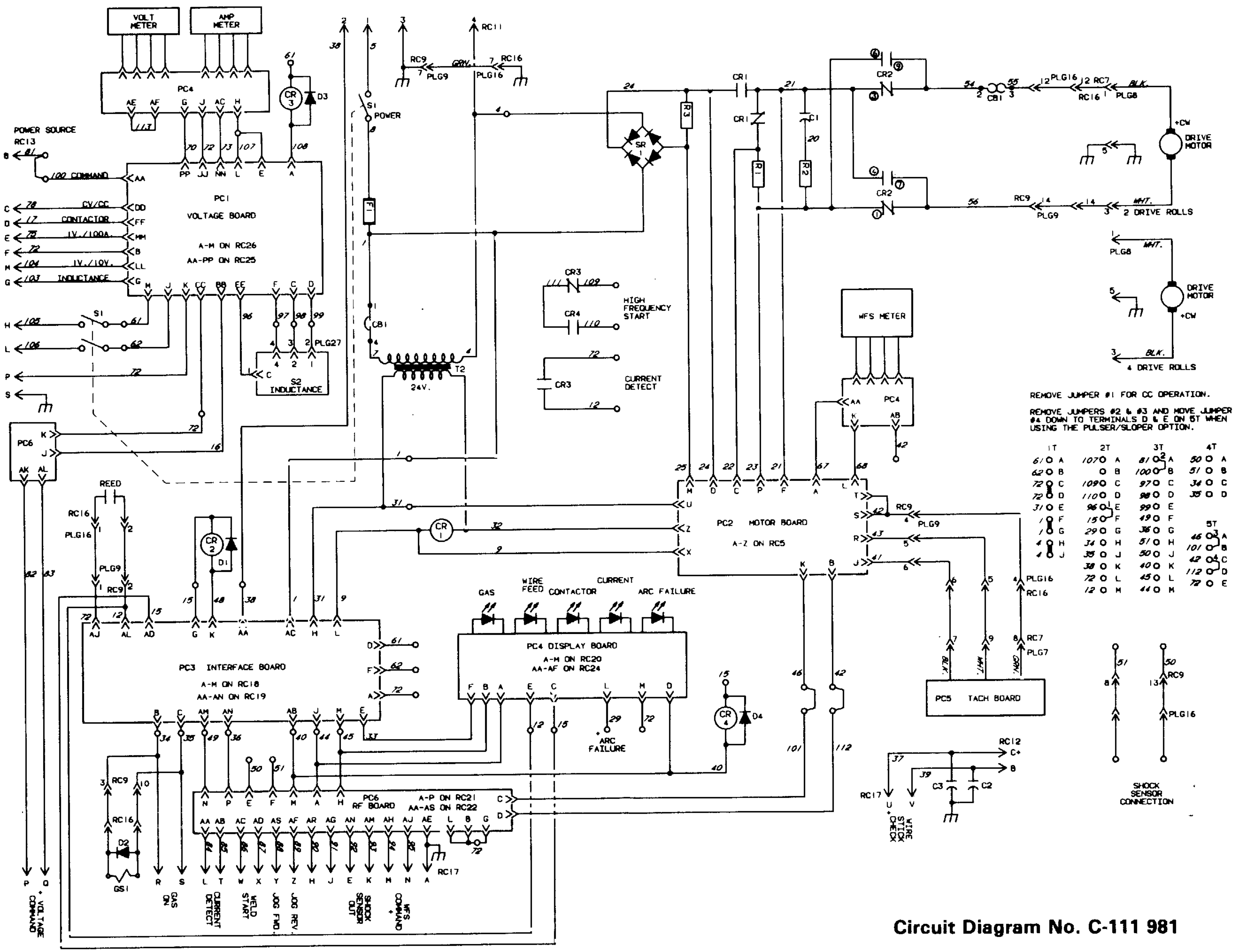
Arc Failure Indicator Light

On

- No arc: Check weld parameters.
- Arc started: Check signal from robot. Signal should be 24vdc between terminals 2TL and 2TG. Check display board PC4.

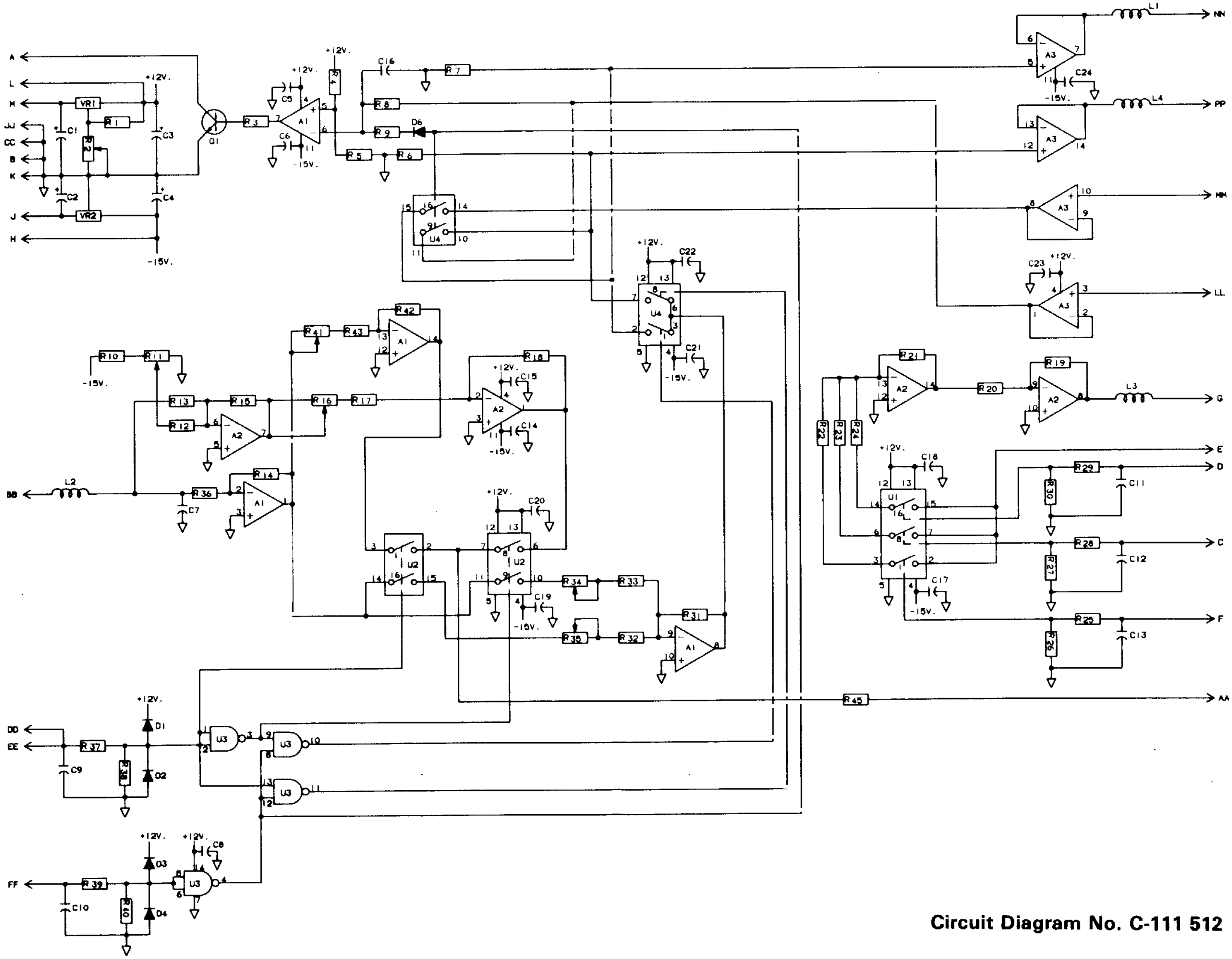
Off

- No arc: Normal during idling.
- Arc started: Normal while welding.



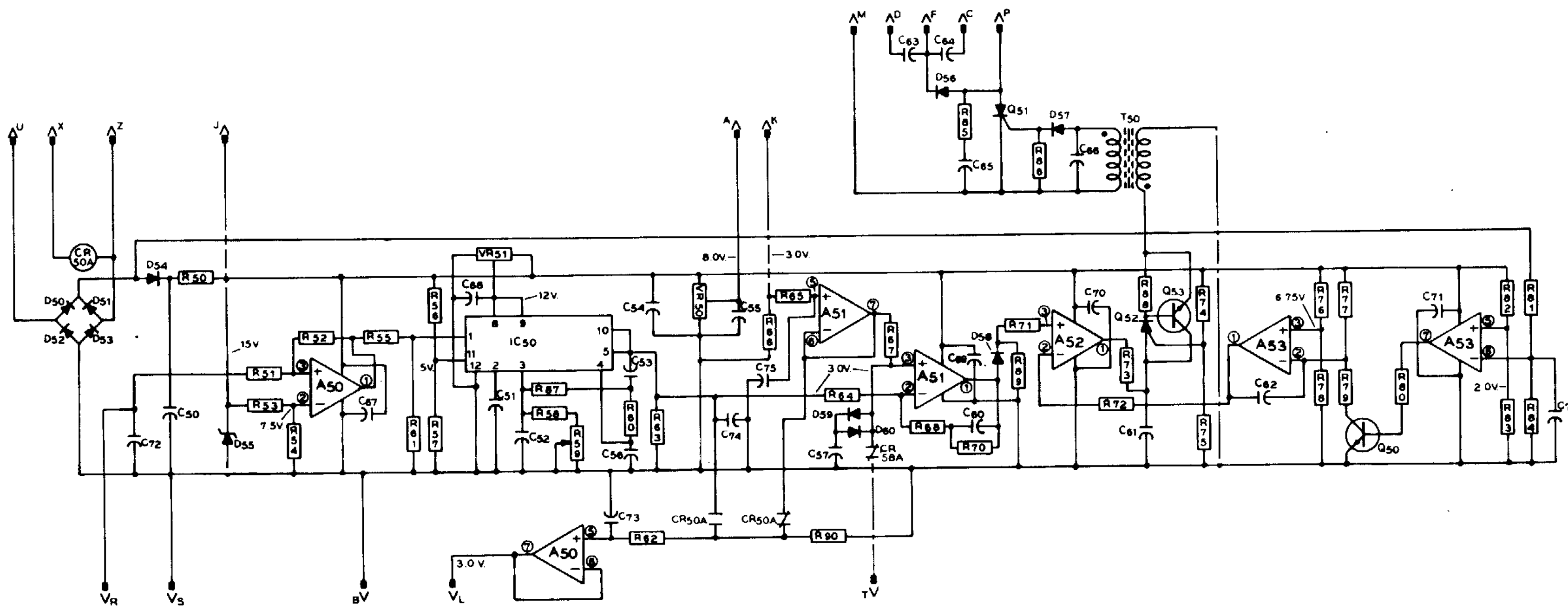
Circuit Diagram No. C-111 981

Figure 5 - 3. Circuit Diagram For Computer Interface



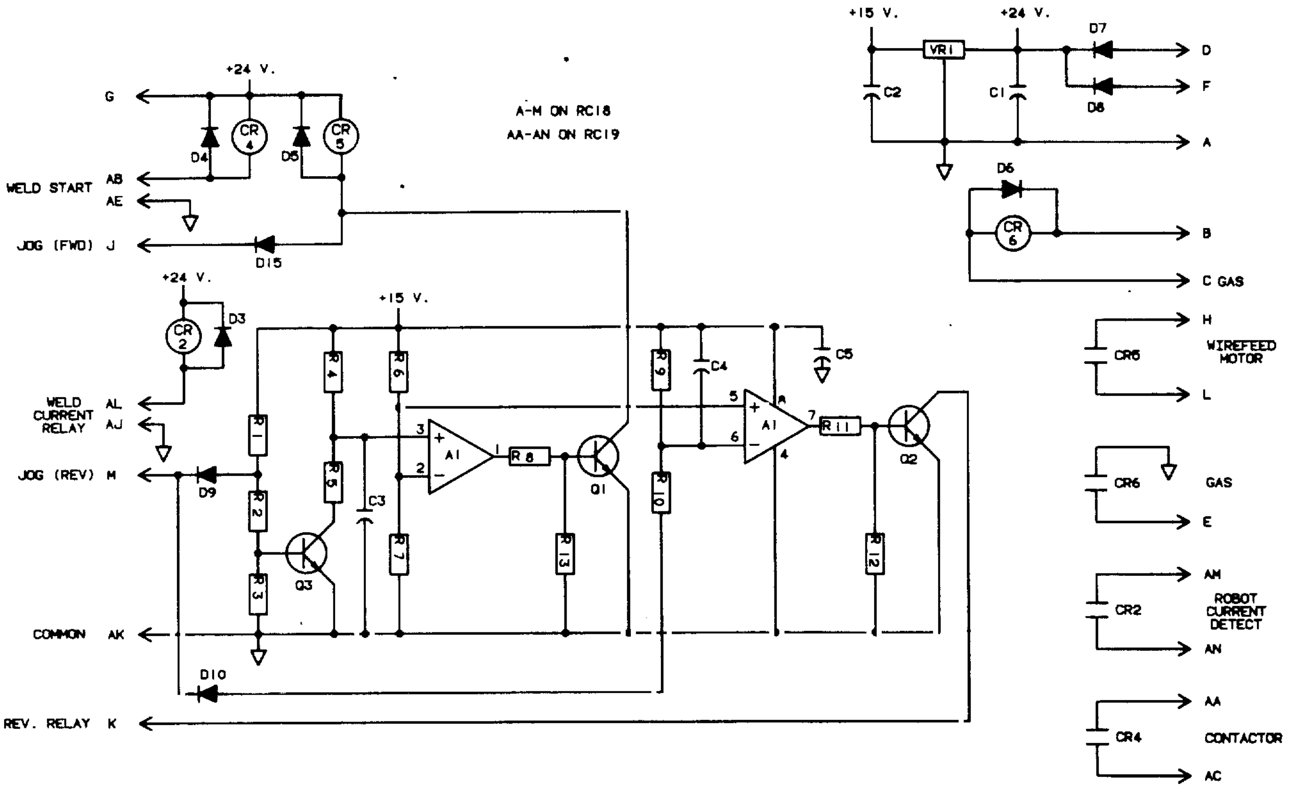
Circuit Diagram No. C-111 512

Figure 5 - 4. Circuit Diagram For Voltage Control Board PC1



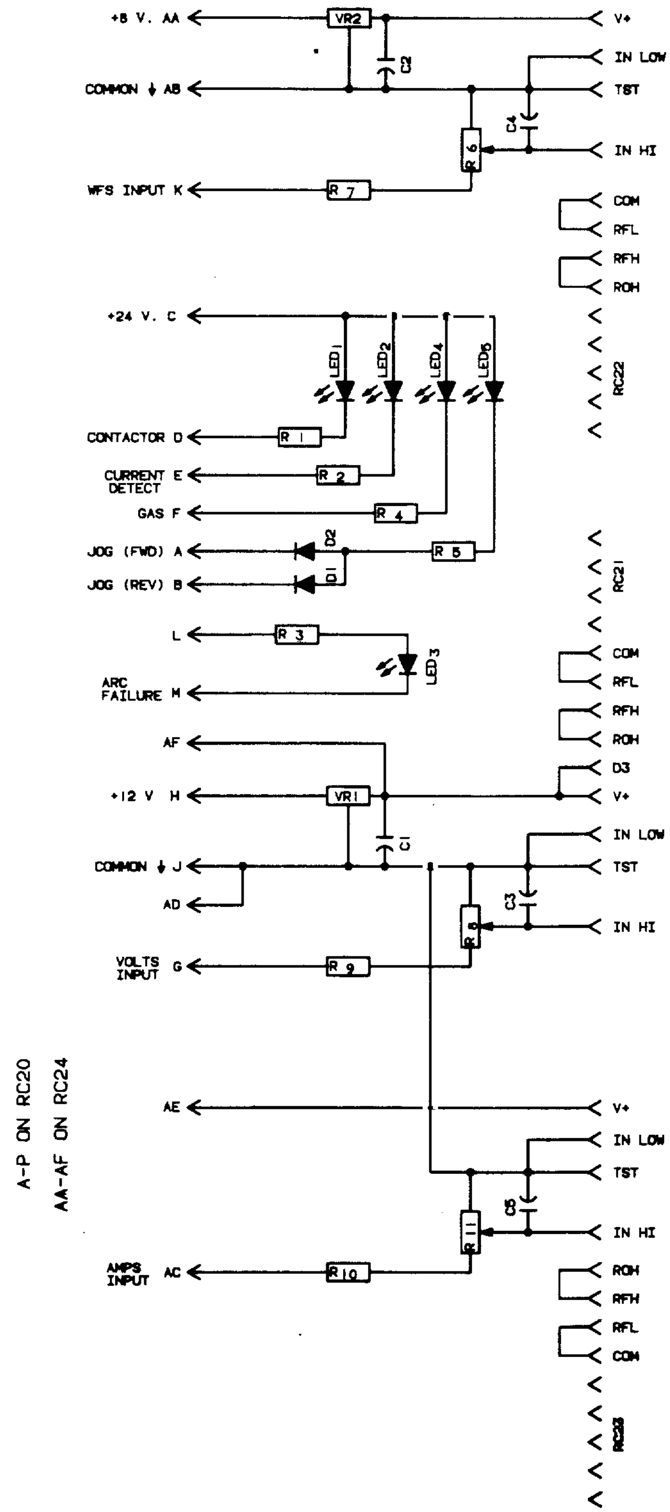
Circuit Diagram No. C-083 388

Figure 5 - 5. Circuit Diagram For Digital Motor Speed Board PC2



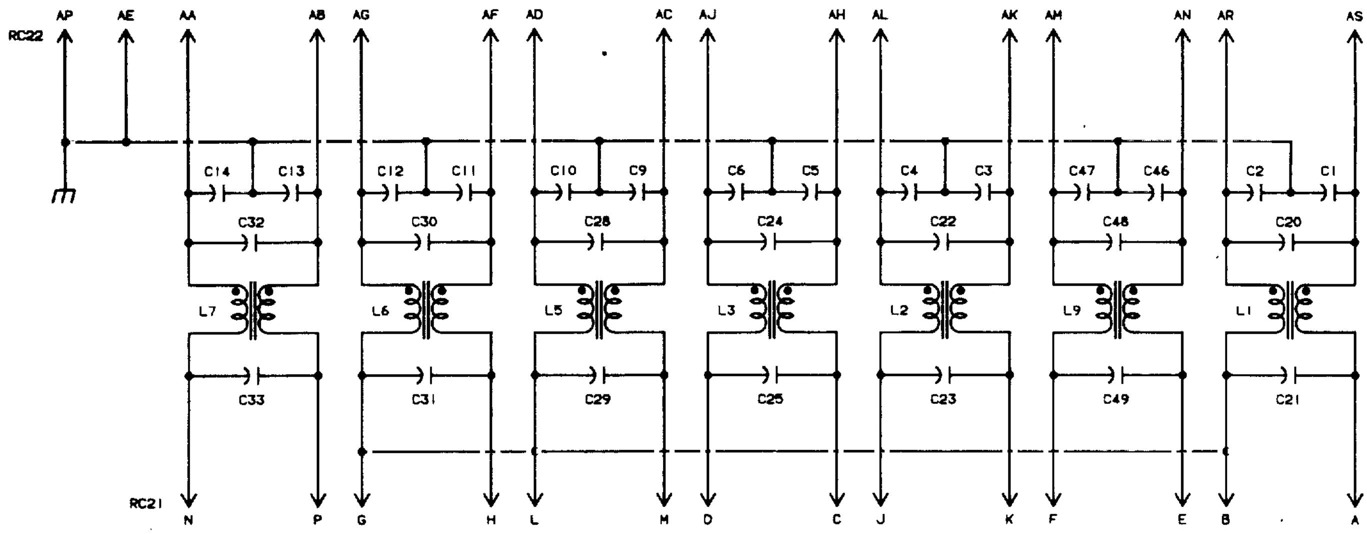
Circuit Diagram No. B-113 431

Figure 5 - 6. Circuit Diagram For Interface Board PC3



Circuit Diagram No. B-111 341

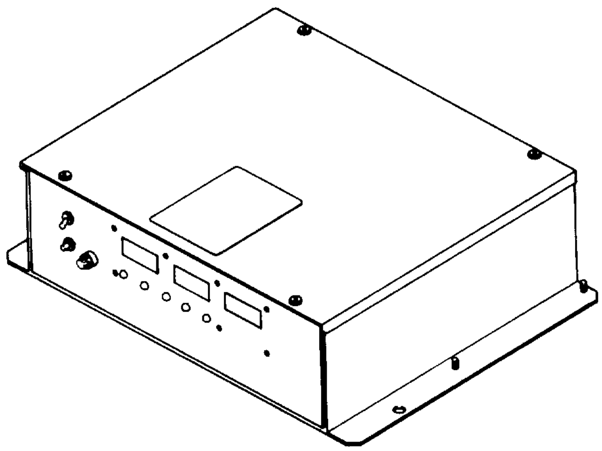
Figure 5 - 7. Circuit Diagram For Display Board PC4



Circuit Diagram No. B-111 117

Figure 5 - 8. Circuit Diagram For RF Filter Board PC6

Effective With Serial No. JH183291



PARTS LIST

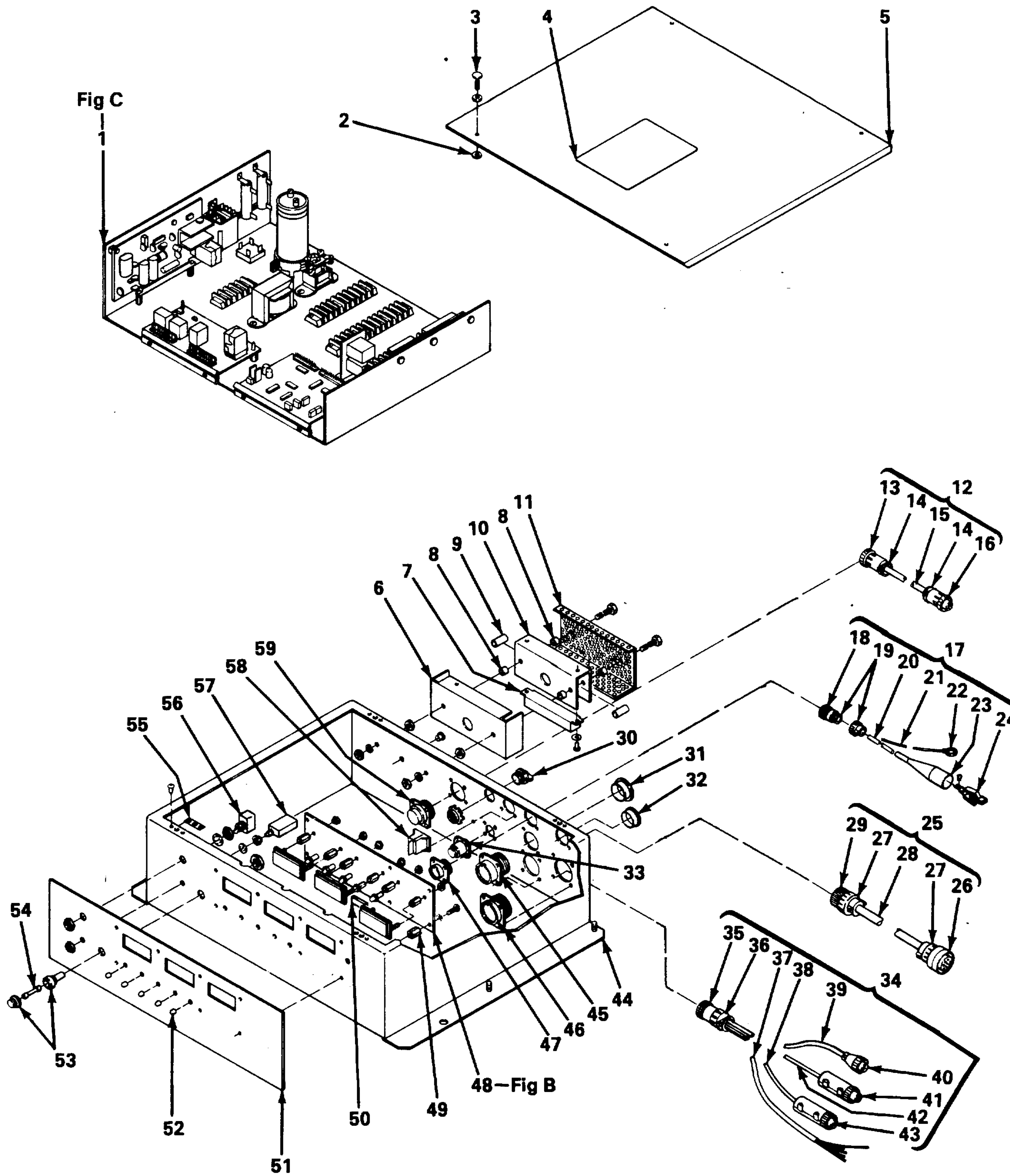


Figure A - Control Box

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure A			**Control Box**	
1		111 992	CONTROL PANEL (Fig C Pg 6)	1
2		010 855	RETAINER, screw No. 2	4
3		010 853	FASTENER, screw-hd No. 2	4
4		070 634	LABEL, warning electric shock can kill etc	1
5		+109 026	COVER, top	1
6		079 683	HEAT SINK	1
7	R2	030 941	RESISTOR, WW fixed 100 watt 5 ohm	1
8		010 193	TUBING, 3/8 OD x 18 ga wall x 1/4	4
9		010 199	TUBING, .275 ID x .048 wall x 1	2
10		030 949	HEAT SINK	1
11		056 170	SHIELD, resistor	1
12		109 041	CABLE, interconnecting-motor/gas (consisting of)	1
13	PLG9	047 636	. HOUSING PLUG & PINS (consisting of)	1
		079 535	. . TERMINAL, male	14
14		079 739	. CLAMP, cable	2
15		096 813	. CABLE, 18 ga 15/c (order by ft)	18ft
16	PLG16	048 598	. HOUSING PLUG & SOCKETS (consisting of)	1
		079 534	. . TERMINAL, female	16
17		049 989	CABLE, volt-sensing (consisting of)	1
18	PLG12	073 686	. PLUG, 4 socket MS-3106A-14S-2S	1
19		039 328	. CLAMP, cable AN-3057-6	1
20		604 109	. WIRE, stranded 16 ga (order by ft)	19ft
21		600 848	. WIRE, stranded 12 ga (order by ft)	35ft
22		600 750	. TERMINAL, ring tongue 1/2 stud	1
23		601 226	. INSULATOR	1
24		601 228	. CLAMP, universal 25 amp	1
25		111 951	CABLE, control-interconnecting (consisting of)	1
26		097 868	. PLUG, 17 socket MS-3106A-20-29S	1
27		039 734	. CLAMP, cable AN-3057-12	2
28		090 263	. CABLE, No. 18/c (order by ft)	20ft
29		097 866	. PLUG, 17 pin MS-3106A-20-29P	1
30		010 916	CONNECTOR, clamp-cable 3/4 inch	1
31		070 731	BLANK, snap-in 1-3/32 x 1-1/8 mtg hole	1
32		057 360	BLANK, snap-in 1-3/8 mtg hole	1
		047 838	BLANK, snap-in 1 inch mtg hole	2
		039 273	PLUG, 5 pin MS-3106A-16S-8P	1
		039 685	CLAMP, cable AN-3057-8	1
		049 455	CABLE, No. 18 2/c (order by ft)	25ft
33	RC11	048 283	RECEPTACLE W/PINS (consisting of)	1
		079 535	. TERMINAL, male	4
34		111 199	CABLE, interconnecting (consisting of)	1
35	PLG17	109 330	. PLUG, 24 socket MS-3106A-24-28S	1
36		091 100	. CLAMP, cable AN-3057-16	1
37		604 910	. CABLE, 20 ga 5/c (order by ft)	6ft
38		604 571	. CABLE, 18 ga 4/c (order by ft)	6ft
39		090 890	. CABLE, No. 20 8/c (order by ft)	6ft
40	ICN4	109 159	. CONNECTOR	1
41	ICN2	109 157	. CONNECTOR	1
42		604 825	. CABLE, 18 3/c (order by ft)	6ft
43	ICN3	109 158	. CONNECTOR	1
44		113 736	CABINET, control	1
45	RC13	097 867	RECEPTACLE, 17 pin MS-3102A-20-29P	1
	C2,3	028 291	CAPACITOR, ceramic 0.1 uf 500 volts dc	2
46	RC17	094 591	RECEPTACLE, 24 pin MS-3102A-14S-2P	1
47	RC12	076 624	RECEPTACLE, 4 pin MS-3102A-14S-2P	1
		057 084	BUSHING, snap 1/4 ID x 3/8 mtg hole	1
48	PC4	111 564	CIRCUIT CARD, meter (Fig B Pg 4)	1
49		073 756	STAND-OFF, No. 6-32 x 5/8 x 1/4 hex	7
50	PLG21,25	081 380	HOUSING, terminal header 14 pin	2

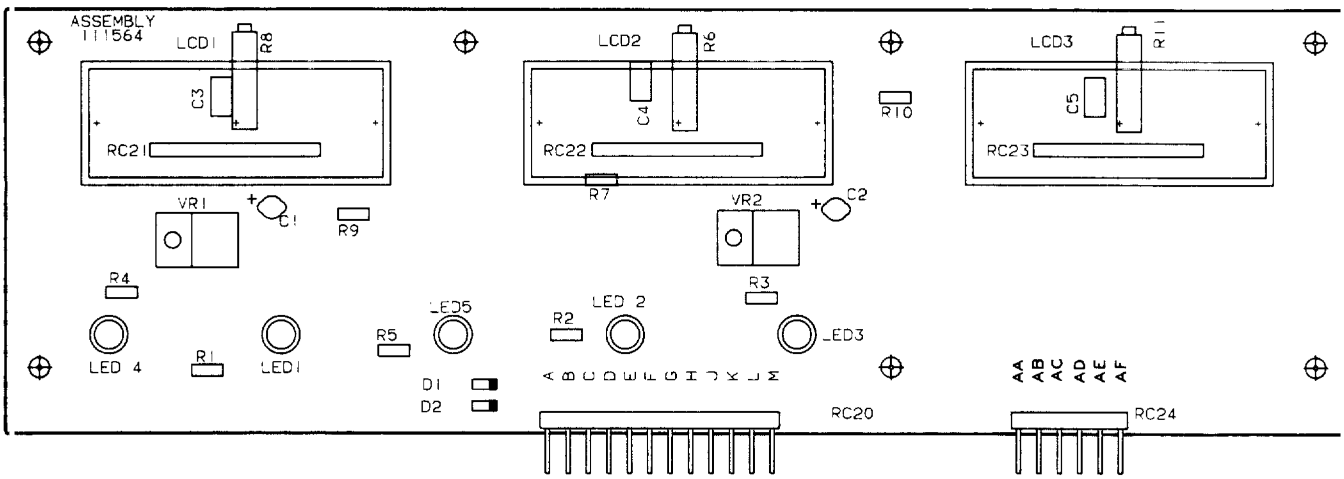
Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure A			**Control Box (Cont'd)**	
51		112 254	LABEL, Miller robot computer interface	1
52		089 032	LENS, led 4341	5
53		046 432	HOLDER, fuse	1
54	F1	*012 655	FUSE, miniature glass 10 amp 250 volts	1
55		073 487	NUT, speed No. 2	4
56	S1	011 622	SWITCH, toggle 3PDT 15 amp 125 volts	1
57	CB1	011 991	CIRCUIT BREAKER, 1 pole 1.5 amp 250 volts	1
58	S2	112 392	SWITCH, code	1
59	RC9	047 637	HOUSING RECEPTACLE & SOCKETS (consisting of)	1
		079 534	. TERMINAL, female	14
	D1	026 202	DIODE, 1 amp 400 volts SP	1
	PLG18	079 760	HOUSING, terminal header 12 pin	1
	PLG19	079 798	HOUSING, terminal header 13 pin	1
	PLG20,26	081 379	HOUSING, terminal header 12 pin	2
	PLG22	092 159	HOUSING, terminal header 16 pin	1
	PLG24	084 198	HOUSING, terminal header 6 pin	1
	PLG27	111 500	CONNECTOR, plug 5 position	1

*Recommended Spare Parts

+When ordering a component originally displaying a precautionary label, the label should also be ordered.

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

Dia. Mkgs.	Part No.	Description	Quantity
Figure B	**111 564**	**Circuit Card, Meter (Fig A Pg 2 Item 48)**	
C1,2	000 348	CAPACITOR, tantalum 0.47 uf 35 volts	2
C3-5	073 739	CAPACITOR, ceramic 0.1 uf 50 volts dc	3
D1,2	028 351	DIODE, signal 0.020 amp 75 volts SP	2
LCD1-3	108 453	METER, DC 0-200MV	3
LED1,2,4,5	089 028	LED, 5330A10 40MCD	4
LED3	097 763	LED, 5330A19 200MCD	1
R1-5	044 635	RESISTOR, carbon film 0.25 watt 680 ohm	5
R6,8,11	030 140	POTENTIOMETER, cermet 15 turn 0.75 watt 220K ohm	3
R7,9,10	003 272	RESISTOR, carbon film 0.25 watt 1 meg ohm	3
RC20	081 382	TERMINAL, header 12 pin	1
RC21-23	109 161	TERMINAL, header 13 socket	3
RC24	084 194	TERMINAL, header 6 pin	1
VR1,2	071 248	IC, linear 78M05	2
	070 026	STAND-OFF, No. 6-32 x 7/16 x 1/4 hex	2



Ref: D-111 566

COMPONENTS TO BE REPLACED BY QUALIFIED PERSONNEL ONLY

Figure B - Circuit Card, Meter

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

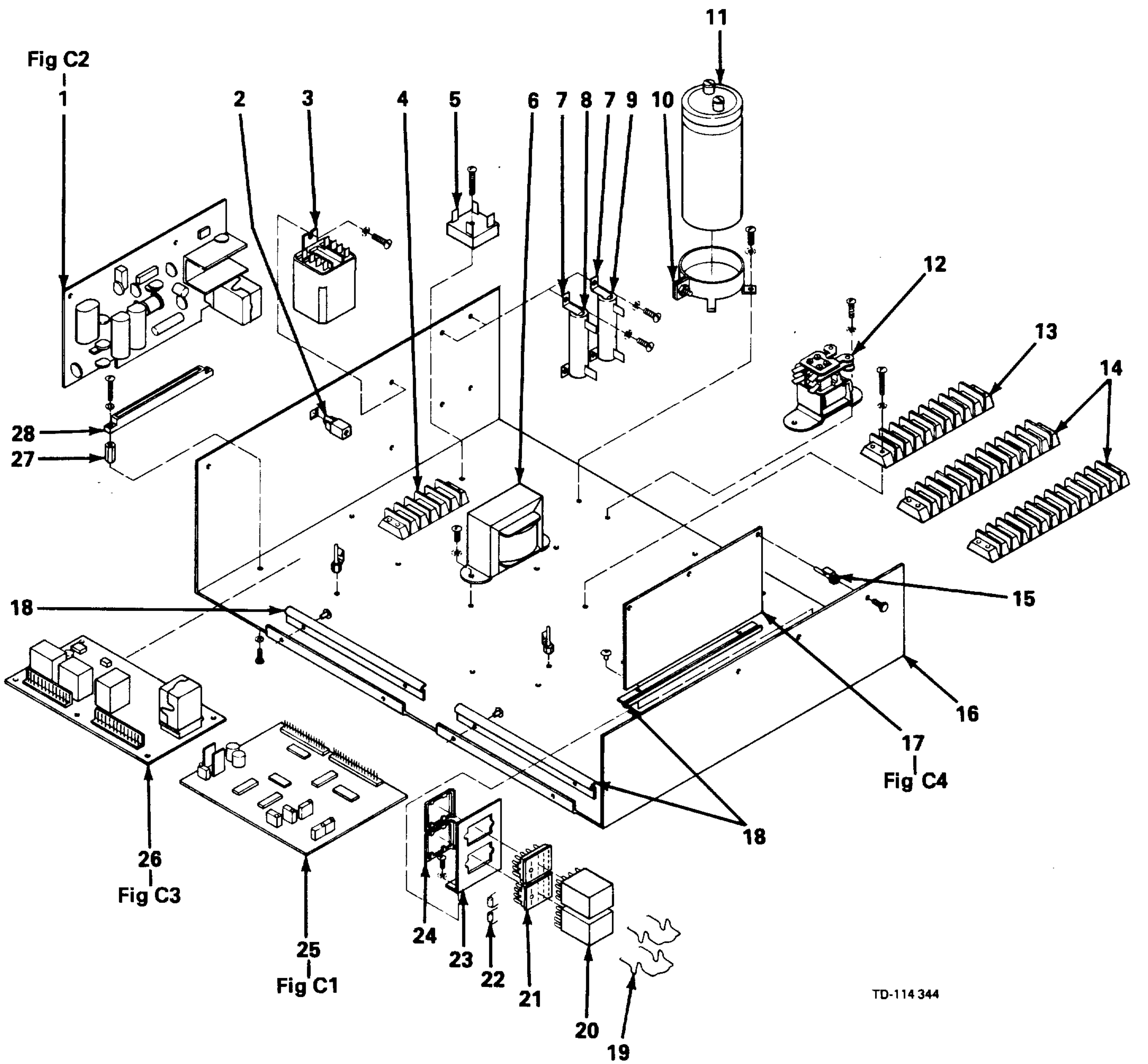
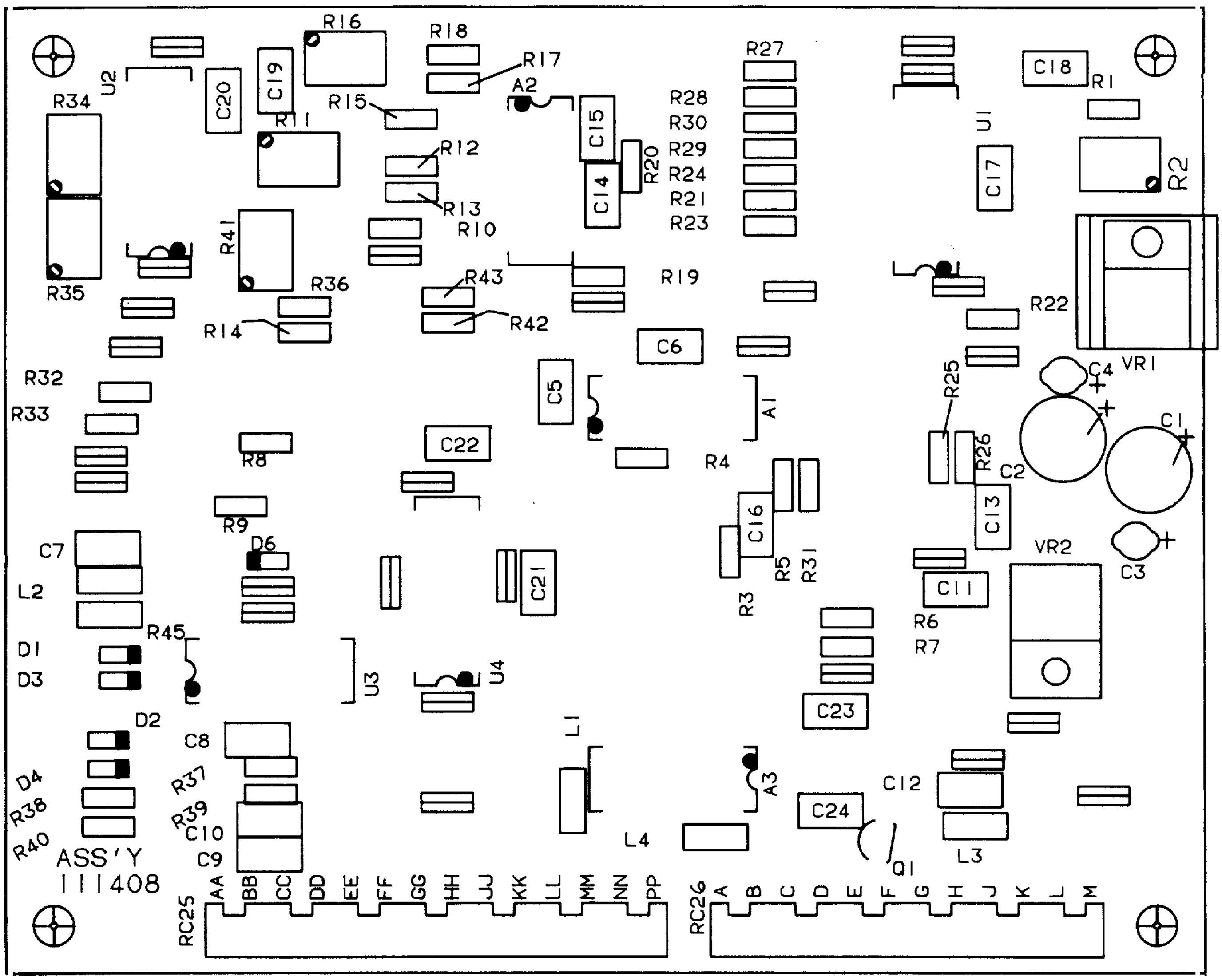


Figure C - Control Panel

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure C		**111 992**	**Control Panel (Fig A Pg 2 Item 1)**	
1	PC2	071 642	CIRCUIT CARD, digital motor speed (Fig C2 Pg 10)	1
2		083 147	GROMMET, screw 8-10 push in	1
3	CR2	052 964	RELAY, enclosed 24 volts dc DPDT	1
4	5T	038 839	BLOCK, terminal 20 amp 5 pole	1
5	SR1	035 914	RECTIFIER, integrated 30 amp 400 volts	1
6	T2	109 017	TRANSFORMER, control	1
7		605 741	CLIP, mtg-resistor	4
8	R3	079 497	RESISTOR, WW fixed 25 watt 2K ohm	1
9	R1	030 651	RESISTOR, WW fixed 25 watt 10 ohm	1
10		006 426	CLAMP, capacitor 2 inch	1
11	C1	031 692	CAPACITOR, electrolyte 750 uf 200 volts dc	1
12	CR1	034 841	RELAY, 24 volts ac DPDT	1
13	1T	038 832	BLOCK, terminal 20 amp 9 pole	1
14	2T,3T	038 783	BLOCK, terminal 20 amp 12 pole	2
		601 219	LINK, jumper	8
15		110 375	STAND-OFF, support	8
16		111 065	PANEL, mtg-components	1
17	PC6	110 565	CIRCUIT CARD, filter (Fig C4 Pg 12)	1
18		110 391	GUIDE, mtg-circuit card	3
19		079 844	SPRING, holddown-relay	2
20	CR3,4	095 521	RELAY, enclosed 24 volts dc 4PDT	2
21		027 811	CONNECTOR, 14 pin	2
22	D3,4	026 202	DIODE, 1 amp 400 volts SP	2
23		048 588	BRACKET, mtg-relay	1
24		048 029	CLIP, retaining-socket relay	2
25	PC1	111 408	CIRCUIT CARD, voltage control (Fig C1 Pg 8)	1
26	PC3	113 221	CIRCUIT CARD, interface (Fig C3 Pg 11)	1
27		009 335	STAND-OFF, No. 4-40 x 5/8 x 1/4	2
28		073 730	TERMINAL, header 22 pin	1

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.



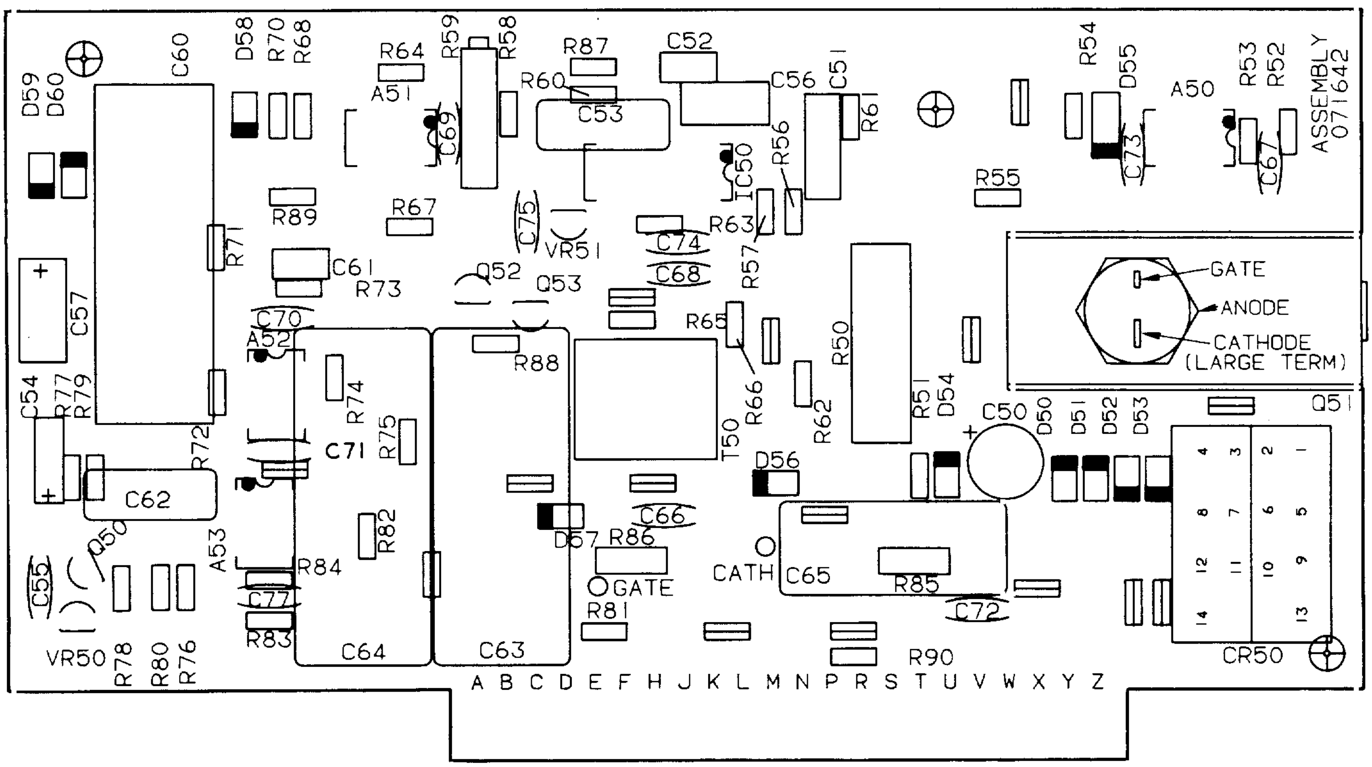
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COMPONENT TO BE REPLACED BY QUALIFIED PERSONNEL ONLY

Figure C1 - Circuit Card, Voltage

Dia. Mkgs.	Part No.	Description	Quantity
Figure C1	**111 408**	**Circuit Card, Voltage (Fig C Pg 6 Item 25)**	
A1-3	096 275	IC, linear 324	3
C1,2	039 482	CAPACITOR, electrolyte 100 uf 35 volts dc	2
C3,4	000 348	CAPACITOR, tantalum 0.47 uf 35 volts	2
C5-15,17-24	073 739	CAPACITOR, ceramic 0.1 uf 50 volts dc	19
C16	097 488	CAPACITOR, ceramic 0.15 uf 50 volts	1
D1-4,6	028 351	DIODE, signal 0.020 amp 75 volts SP	5
L1-4	095 258	CHOKE, 1000 UH 28MA	4
Q1	037 200	TRANSISTOR, NPN 200MA 40 volts	1
R1	035 824	RESISTOR, carbon film 0.25 watt 270 ohm	1
R2,34,35,41	009 173	POTENTIOMETER, cermet 20 turn 0.5 watt 5K ohm	4
R3	039 333	RESISTOR, carbon film 0.25 watt 18K ohm	1
R4,20,26,27,30, 38,40	039 332	RESISTOR, carbon film 0.25 watt 15K ohm	7
R5,9,10,18,25,28, 29,37,39	000 885	RESISTOR, carbon film 0.25 watt 10K ohm	9
R6,7,12-15,36	044 789	RESISTOR, carbon film 0.25 watt 100K ohm	7
R8	052 136	RESISTOR, carbon film 0.25 watt 150K ohm	1
R11,16	000 038	POTENTIOMETER, cermet 25 turn 0.5 watt 2K ohm	2
R17	039 331	RESISTOR, carbon film 0.25 watt 4.7K ohm	1
R19,21,43	053 572	RESISTOR, carbon film 0.25 watt 12K ohm	3
R22,42	052 138	RESISTOR, carbon film 0.25 watt 20K ohm	2
R23	052 139	RESISTOR, carbon film 0.25 watt 39K ohm	1
R24	039 325	RESISTOR, carbon film 0.25 watt 82K ohm	1
R31	052 137	RESISTOR, carbon film 0.25 watt 5.1K ohm	1
R32	035 826	RESISTOR, carbon film 0.25 watt 6.8K ohm	1
R33	091 799	RESISTOR, carbon film 0.25 watt 8.2K ohm	1
R45	035 823	RESISTOR, carbon film 0.25 watt 100 ohm	1
	092 648	RESISTOR, carbon film 0.25 watt zero ohm	26
RC25	089 347	TERMINAL, header 14 pin	1
RC26	089 346	TERMINAL, header 12 pin	1
U1	112 058	IC, interface 212	1
U2,4	095 268	IC, interface 211	2
U3	008 970	IC, digital 4011	1
VR1	095 269	IC, linear 317T	1
VR2	046 932	IC, linear 7915	1

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.



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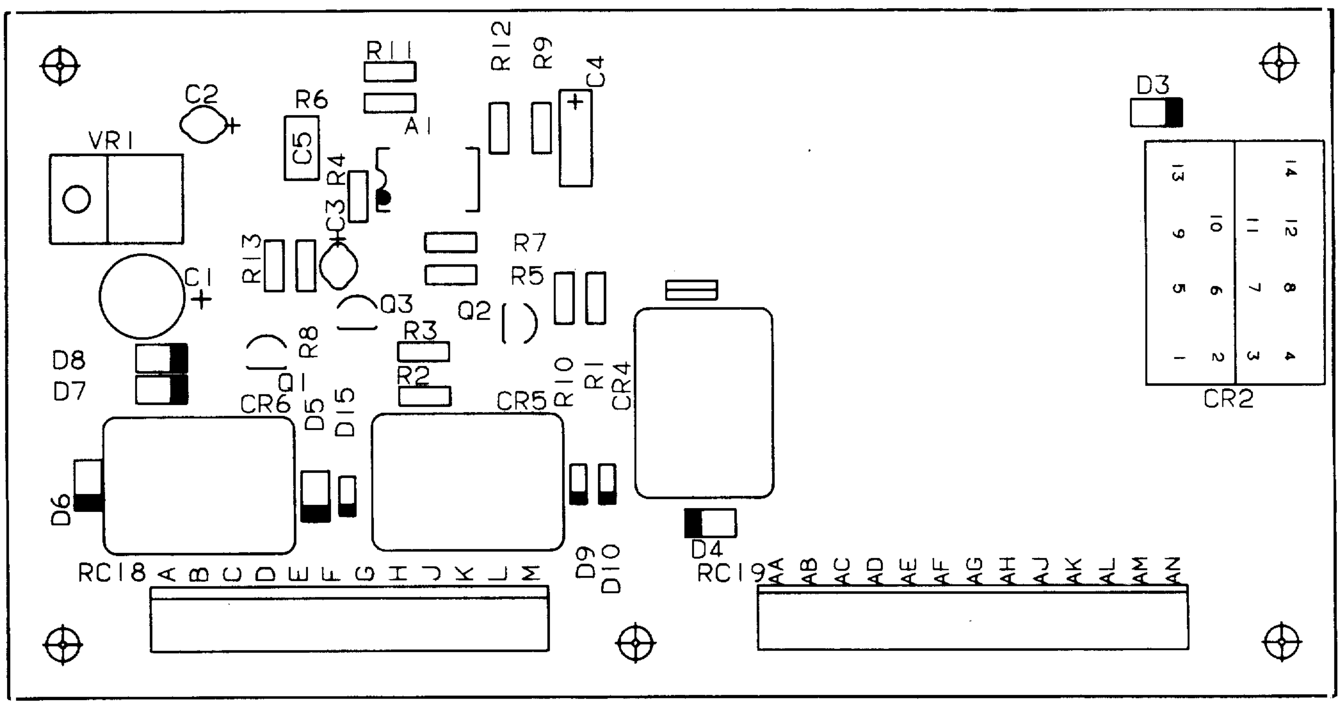
COMPONENTS TO BE REPLACED BY QUALIFIED PERSONNEL ONLY

Figure C2 - Circuit Card, Digital Motor Speed

Dia. Mkgs.	Part No.	Description	Quantity
Figure C2	**071 642**	**Circuit Card, Digital Motor Speed (Fig C Pg 6 Item 1)**	
A50-53	009 159	IC, linear 358	4
C50	039 482	CAPACITOR, electrolyte 100 uf 35 volts dc	1
C51	031 699	CAPACITOR, mylar 0.0022 uf 200 volts dc	1
C52,61	073 739	CAPACITOR, ceramic 0.1 uf 50 volts dc	2
C53,62	035 833	CAPACITOR, mylar 0.033 uf 100 volts dc	2
C54	005 023	CAPACITOR, tantalum 2.2 uf 20 volts	1
C55,66-75,77	031 643	CAPACITOR, ceramic 0.01 uf 500 volts dc	12
C56	073 549	CAPACITOR, mylar 0.015 uf 200 volts	1
C57	031 677	CAPACITOR, tantalum 5.6 uf 35 volts dc	1
C60	035 561	CAPACITOR, mylar 4 uf 200 volts	1
C63,64	044 602	CAPACITOR, poly-film 0.47 uf 400 volts dc	2
C65	031 721	CAPACITOR, mylar 0.22 uf 200 volts dc	1
CR50	095 033	RELAY, enclosed 24 volts ac 4PDT	1
	091 861	SOCKET, relay	1
	079 844	SPRING, holddown-relay	1
D50-54,56-60	026 202	DIODE, 1 amp 400 volts SP	10
D55	080 910	DIODE, zener 15 volts 5 watt	1
IC50	081 800	IC, interface 2907	1
Q50,53	037 200	TRANSISTOR, NPN 200MA 40 volts	2
Q51	037 824	THYRISTOR, SCR 7.4 amp 200 volts SP	1
Q52	039 335	TRANSISTOR, UJT 15MA 40 volts	1
R50	030 839	RESISTOR, WW fixed 5 watt 220 ohm	1
R51,54,55,57,67, 68,74,75,82,89	035 827	RESISTOR, carbon film 0.25 watt 10K ohm	10
R52,56,61	052 138	RESISTOR, carbon film 0.25 watt 20K ohm	3
R53	039 332	RESISTOR, carbon film 0.25 watt 15K ohm	1
R58,62,65,66,71, 72,76,90	035 884	RESISTOR, carbon film 0.25 watt 100K ohm	8
R59	030 007	POTENTIOMETER, cermet 15 turn 0.75 watt 50K ohm	1
R60,87,88	039 335	RESISTOR, carbon film 0.25 watt 47K ohm	3
R63,79	039 106	RESISTOR, carbon film 0.25 watt 1K ohm	2
R64	039 331	RESISTOR, carbon film 0.25 watt 4.7K ohm	1
R70	049 015	RESISTOR, carbon film 0.25 watt 10 meg ohm	1
R73,83	039 328	RESISTOR, carbon film 0.25 watt 1.5K ohm	2
R77	052 142	RESISTOR, carbon film 0.25 watt 120K ohm	1
R78	039 108	RESISTOR, carbon film 0.25 watt 82K ohm	1
R80	035 886	RESISTOR, carbon film 0.25 watt 22K ohm	1
R81,84	035 825	RESISTOR, carbon film 0.25 watt 1K ohm	2
R85	030 937	RESISTOR, carbon 0.5 watt 10 ohm	1
R86	030 090	RESISTOR, carbon 0.5 watt 47 ohm	1
	092 648	RESISTOR, carbon film 0.25 watt zero ohm	15
T50	085 399	TRANSFORMER, pulse	1
VR50	081 799	IC, linear 78L08	1
VR51	047 272	IC, linear 78L12	1
	037 261	HEAT SINK	1

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

Dia. Mkgs.	Part No.	Description	Quantity
Figure C3	**113 221**	**Circuit Card, Interface (Fig C Pg 6 Item 26)**	
A1	009 159	IC, linear 358	1
C1	039 482	CAPACITOR, electrolyte 100 uf 35 volts dc	1
C2	000 348	CAPACITOR, tantalum 0.47 uf 35 volts	1
C3,6,9,10	072 130	CAPACITOR, tantalum 1 uf 35 volts dc	4
C4	005 023	CAPACITOR, tantalum 2.2 uf 20 volts	1
C5,11	073 739	CAPACITOR, ceramic 0.1 uf 50 volts dc	2
CR4-6	099 018	RELAY, enclosed 24 volts dc SPDT	3
CR2	095 521	RELAY, enclosed 24 volts dc 4PDT	1
	091 861	SOCKET, relay	1
	079 844	SPRING, holddown-relay	1
D3-8	026 202	DIODE, 1 amp 400 volts SP	6
D9,10,15	028 351	DIODE, signal 0.020 amp 75 volts SP	3
Q1-3	037 200	TRANSISTOR, NPN 200MA 40 volts	3
R1,2,8,11	035 826	RESISTOR, carbon film 0.25 watt 6.8K ohm	4
R3,6,7,12,13	039 331	RESISTOR, carbon film 0.25 watt 4.7K ohm	5
R4	072 561	RESISTOR, carbon film 0.25 watt 270K ohm	1
R5,10	039 106	RESISTOR, carbon film 0.25 watt 470 ohm	2
R9	052 145	RESISTOR, carbon film 0.25 watt 470K ohm	1
RC18	079 759	TERMINAL, header 12 pin	1
RC19	079 795	TERMINAL, header 13 pin	1
VR1	081 832	IC, linear 78M15	1



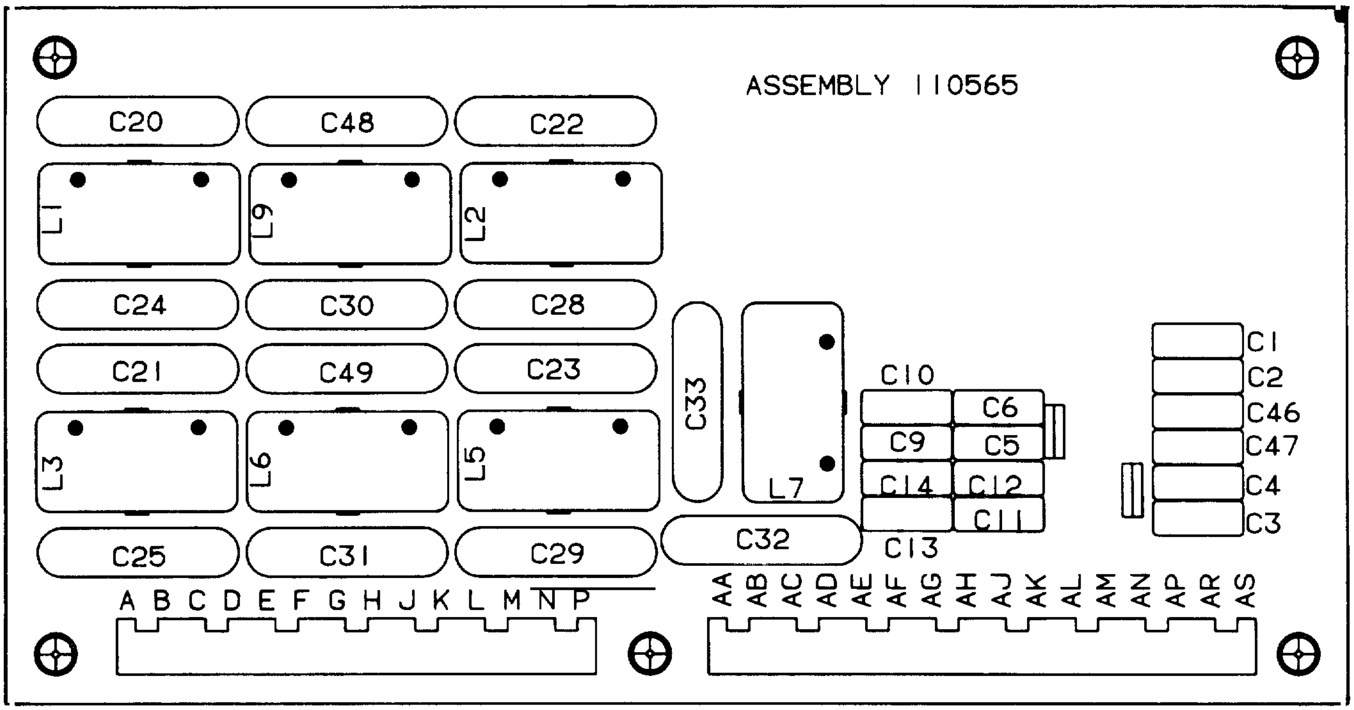
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COMPONENTS TO BE REPLACED
BY QUALIFIED PERSONNEL ONLY

Figure C3 - Circuit Card, Interface

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

Dia. Mkgs.	Part No.	Description	Quantity
Figure C4	**110 565**	**Circuit Card, Filter (Fig C Pg 6 Item 17)**	
C1-6,9-14,46,47	028 292	CAPACITOR, ceramic 0.005 uf 1000 volts dc	14
C20-25,28-33,48,49	028 291	CAPACITOR, ceramic 0.1 uf 500 volts dc	14
L1-3,5-7,9	110 190	CHOKE, 1000 UH	7
RC21	089 347	TERMINAL, header 14 pin	1
RC22	092 160	TERMINAL, header 16 pin	1



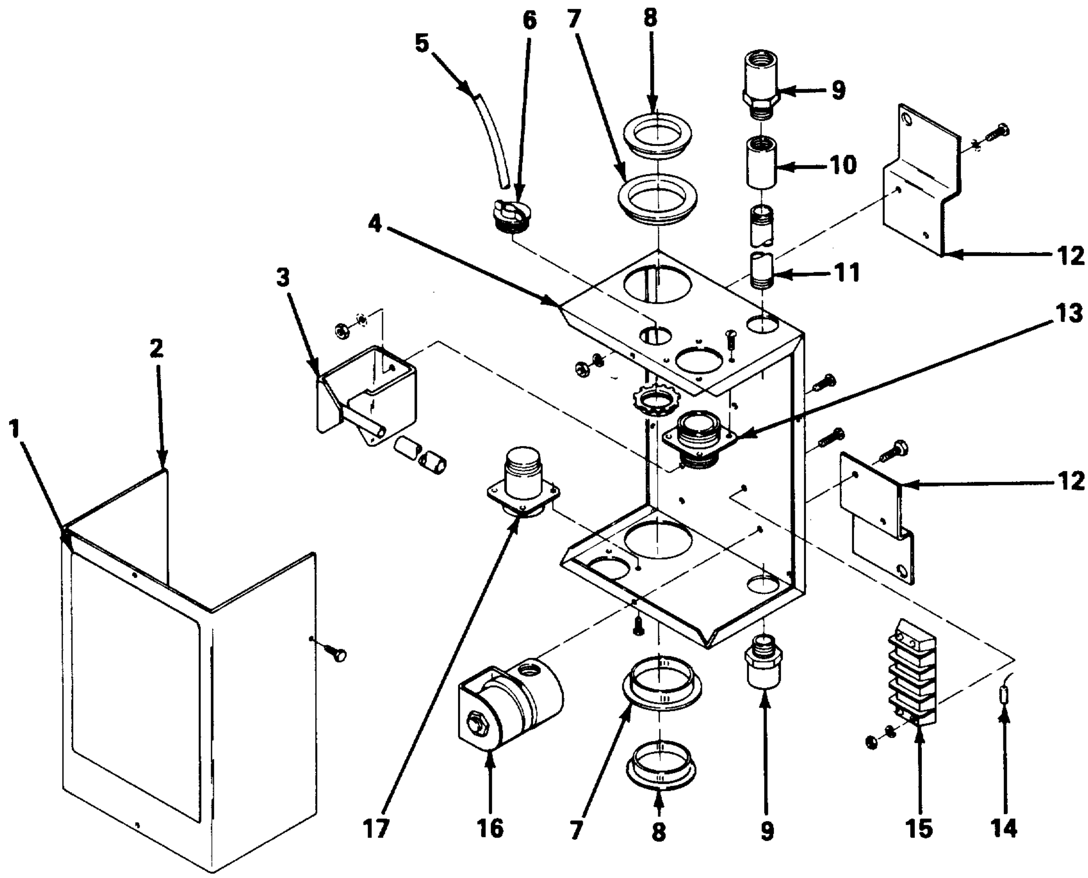
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COMPONENTS TO BE REPLACED BY QUALIFIED PERSONNEL ONLY

Figure C4 - Circuit Card, Filter

BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

Item No.	Dia. Mkgs.	Part No.	Description	Quantity
Figure D		**109 936**	**Control Box, Gas/Current Sensor**	
1		047 497	LABEL, general precautionary	1
2		+079 682	WRAPPER	1
3	REED	079 687	RELAY, current	1
4		109 021	CASE SECTION, bottom/front/sides	1
5		049 455	CORD, No. 18 2/c (order by ft)	2ft
6		010 610	CONNECTOR, clamp-cable 1/2 inch	1
7		010 494	BUSHING, snap 1-3/8 ID x 1-3/4 mtg hole	2
8		057 358	BUSHING, snap ID x 1.37 mtg hole	2
9		010 604	FITTING, hose-brass bushing 1/4 NPT x 5/8-18	2
10		602 934	FITTING, pipe-coupling 1/4 NPT	1
11		079 573	FITTING, pipe-nipple L 1/4 NPT x 6	1
12		079 574	BRACKET, mtg-component	2
13	RC7	047 637	HOUSING RECEPTACLE & SOCKETS (consisting of)	1
		079 534	. TERMINAL, female	14
14	D2	109 938	DIODE, 1 amp 400 volts SP	1
15	4T	038 081	BLOCK, terminal 20 amp 4 pole	1
16	GS1	109 561	VALVE, 24 volts dc 2 way 1/4 IPS port 1/8 orifice	1
17	RC16	090 246	RECEPTACLE W/PINS (consisting of)	1
		079 535	. TERMINAL, male	9



TC-109 680

Figure D - Control Box, Gas/Current Sensor

+When ordering a component originally displaying a precautionary label, the label should also be ordered.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.

April 20, 1989 FORM: OM-882

ERRATA SHEET

After this manual was printed, refinements in equipment design occurred. This sheet lists exceptions to data appearing later in this manual.

AMENDMENT TO SECTION 2 – INSTALLATION

IMPORTANT: *A 25 ft. (8m) interconnecting cord with a five-pin Amphenol plug is supplied with this unit but is not used in this installation. Retain cord for future use.*

Amend Section 2-5. COMPUTER INTERFACE TERMINAL STRIP CONNECTIONS

WARNING: ELECTRIC SHOCK can kill.

- *Do not touch live electrical parts.*
- *Shut down unit, welding power source, and robot, and disconnect input power employing lockout/tagging procedures before making interconnections.*

Lockout/tagging procedures consist of padlocking line disconnect switch in open position, removing fuses from fuse box, or shutting off and red-tagging circuit breaker or other disconnecting device.

There are several terminal strips inside the computer interface for control connections. Remove unit top cover, loosen screws on strain relief on unit rear panel if necessary, and locate appropriate terminal strip for connections. Tighten screws on strain relief if necessary, and reinstall top cover when procedure is finished.

A. CV/CC Connections

WARNING: Read and follow safety information at beginning of Section 2-5 before proceeding.

1. Locate terminal strip 2T.
2. For CC operation, remove jumper link between terminal E and F on 2T.

IMPORTANT: *The Inductance control is disabled when operating in the CC (constant current) mode.*

B. ARC FAILURE Light Connections (Figure 2-4)

WARNING: Read and follow safety information at beginning of Section 2-5 before proceeding.

The ARC FAILURE light on the computer interface front panel is turned on and off by a signal from the robot control unit. Locate supplied length of 18 gauge/2-conductor cord for this connection, and proceed as follows:

1. For robot control units with no other connections at jig terminal strip 2:
   a. Open robot control unit door, and locate jig terminal strip 2.
   b. Route cord under cross member below door.
   c. Make cord connections to terminal strip common and the Weld Alarm terminal.
   d. Close robot control unit door, and route cord through strain relief on rear panel of computer interface.
   e. Connect cord to 2TF and 2TG.
2. For robot control units when 115 or 24 vac, or 24 vdc is used at jig terminal strip 2T:
   a. Obtain a 115 or 24 vac, or 24 vdc isolation relay, and install into jig interface.
   b. Open robot control unit door, and locate jig terminal strip 2.

c. Route customer supplied 18 gauge/2-conductor cord under cross member below door.
d. Make cord connections to terminal strip common and the Weld Alarm terminal.
e. Close robot control unit door, and route cord to jig interface.
f. Connect cord to isolation relay coil and voltage source.
g. Cut off terminals from one end of supplied 18 gauge/2-conductor cord, and install terminals to connect to contacts on isolation relay.
h. Connect one end of cord to a set of normally-open contacts on isolation relay.
i. Route cord through strain relief on rear panel of computer interface.
j. Connect cord to 2TF and 2TG.

Add Figure 2-4. Arc Failure Light Connections

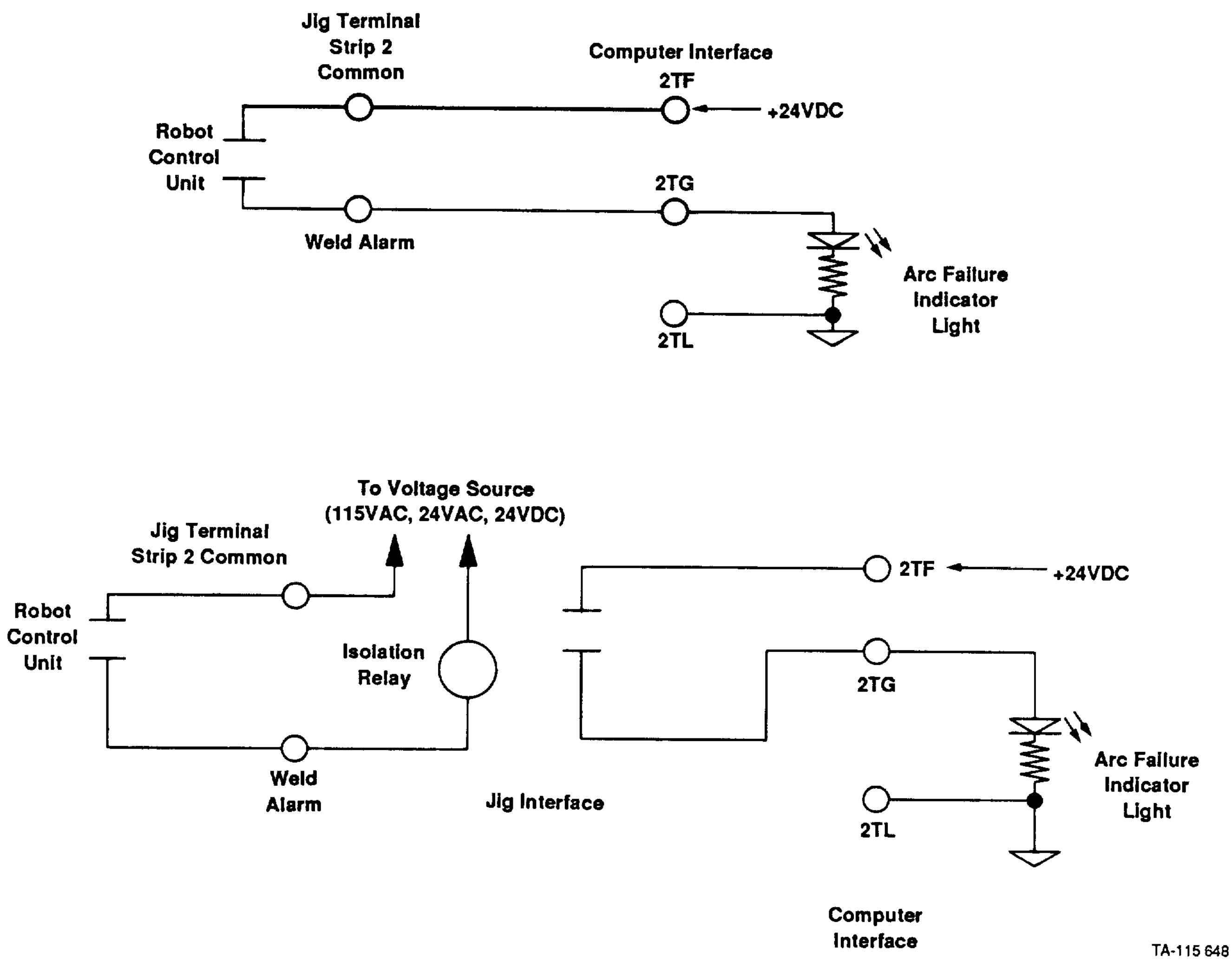
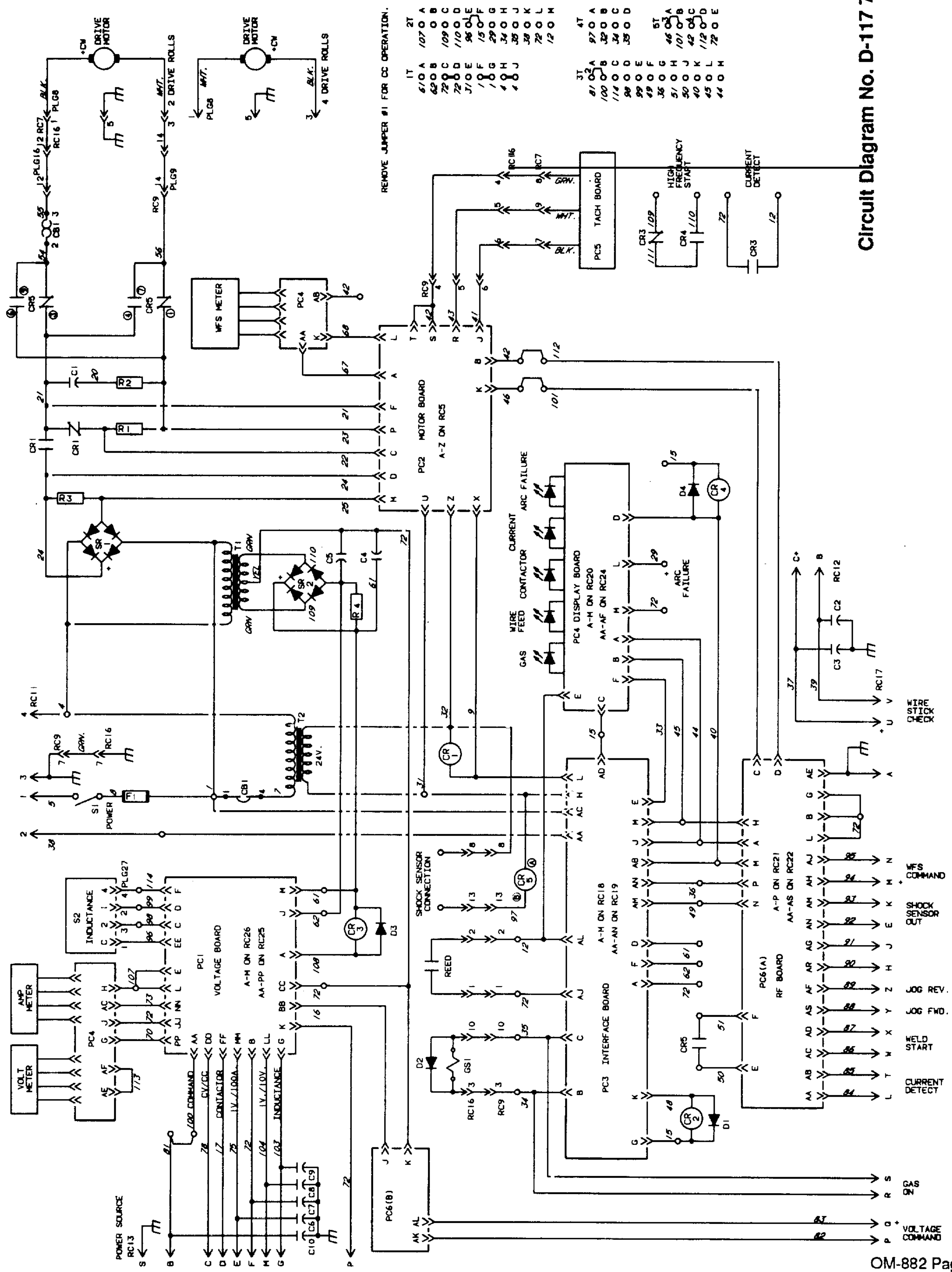


Figure 2-4. Arc Failure Light Connections

AMENDMENT TO SECTION 5 – MAINTENANCE & TROUBLESHOOTING

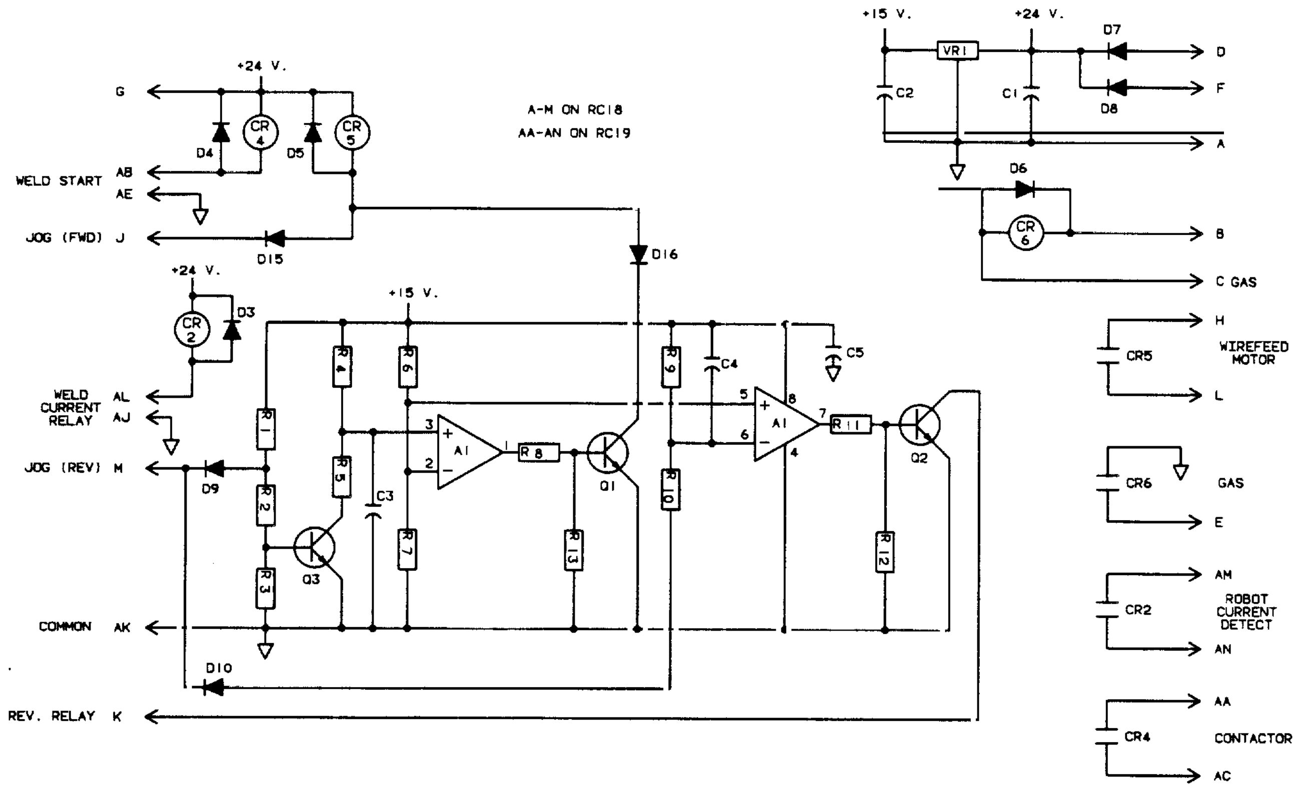
Amend Figure 5-3. Circuit Diagram For Computer Interface



Circuit Diagram No. D-117 727-B

Figure 5-3. Circuit Diagram For Computer Interface Effective With Serial No. JH290689

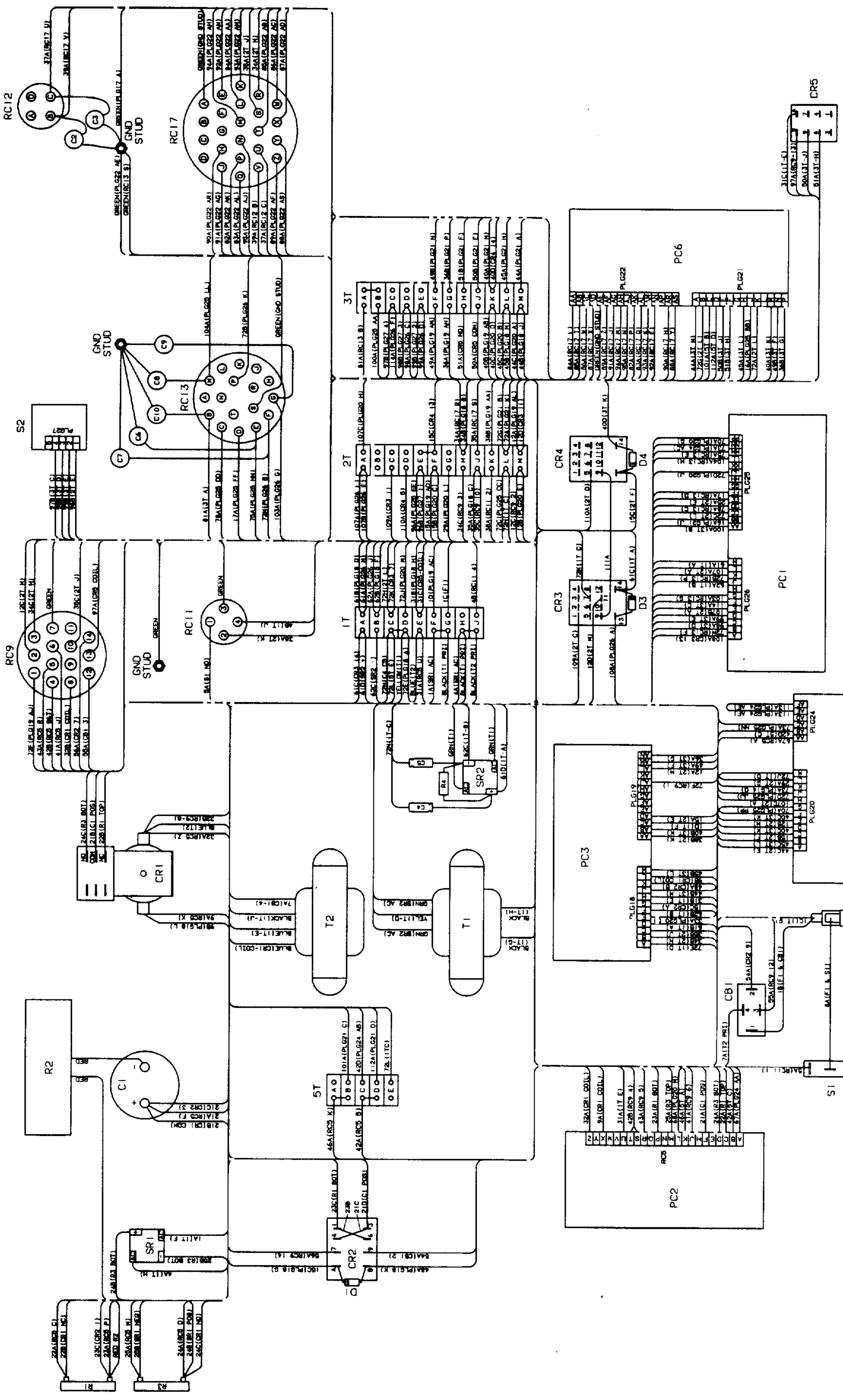
Amend Figure 5-6. Circuit Diagram For Interface Board PC3



Circuit Diagram No. B-128 016

Figure 5-6. Circuit Diagram For Interface Board PC3 Effective With Serial No. JK588314

Add Figure 5-9. Wiring Diagram



Wiring Diagram No. D-117 728

Figure 5-9. Wiring Diagram Effective With Serial No. JH290689

AMENDMENT TO PARTS LIST

Amend Parts List as follows:

**	Dia. Mkgs	Part No.	Replaced With	Description	Quantity
2-1		111 992	117 724	CONTROL PANEL	1
2-4		070 634	123 154	LABEL, warning general precautionary	1
2-17		049 989	118 676	CABLE, volt sensing (Eff w/HJ304076)	1
2-20		604 109	604 109	WIRE, (qty chg)	26ft
2-	C2,3,6-10	028 291	028 291	CAPACITOR, (qty chg)	7
2-48	PC4	111 564	117 836	CIRCUIT CARD, meter	1
3-56	S1	011 622	011 609	SWITCH, toggle SPDT 15 amp 125 volts	1
4-	R1-5	044 635	030 028	RESISTOR, carbon 0.5 watt 1.5K ohm	1
6-2		083 147	083 147	GROMMET, (qty chg)	2
6-5	SR1,2	035 914	035 914	RECTIFIER, (qty chg)	2
6-15		110 375	110 375	STAND OFF, (qty chg)	7
6-16		111 065	121 313	PANEL, mtg-components (Eff w/JJ377225)	1
6-26	PC3	113 221	128 014	CIRCUIT CARD, interface (Eff w/JK588314)	1
6-28	RC5	073 730	073 730	TERMINAL, header 22 pin	1
11-	C3	072 130	072 130	CAPACITOR, (qty chg) (Eff w/JK588314)	1
11-	C5	073 739	073 739	CAPACITOR, (qty chg) (Eff w/JK588314)	1
11-	D9,10,15,16	028 351	028 351	DIODE, (qty chg) (Eff w/JK588314)	4
13-		109 936	117 617	CONTROL BOX, gas/current sensor	1
13-6		010 610	115 104	CONNECTOR CLAMP, cable 1/2 inch	1
	CR5		110 386	RELAY, enclosed 24 volts ac DPDT	1
	T1		117 725	TRANSFORMER, control	1
			117 726	CAPACITOR/RESISTOR, (consisting of)	1
	C4,5		000 859	· CAPACITOR, electrolytic 220 uf 35 volts dc	2
	R4		601 394	· RESISTOR, carbon 2 watt 10K ohm	1

**First digit represents page no - digits following dash represent item no.
BE SURE TO PROVIDE MODEL AND SERIAL NUMBER WHEN ORDERING REPLACEMENT PARTS.